Canovision 8

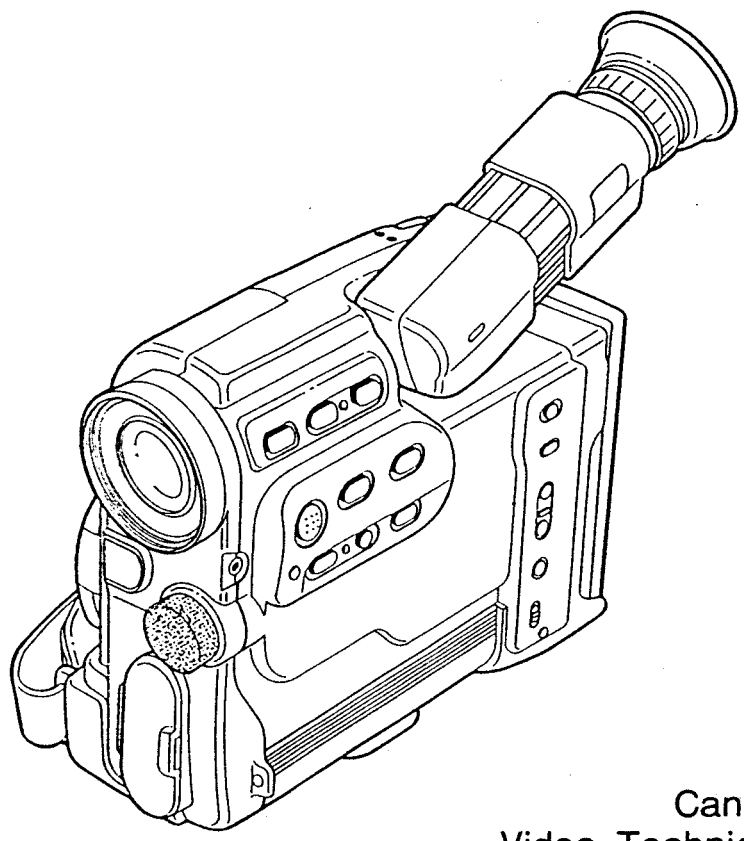
SERVICE MANUAL

UC10E

(REF. NO. D15-5030)

8mm Video Camcorder

PAL



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SAFETY PRECAUTIONS

The following precautions should be observed when servicing.

1. Since many parts in the unit have special safety-related characteristics, always use genuine CANON replacement parts.
   Especially critcal parts in the power circuit block should not be replaced with other makes.
   Critical parts are marked with ⚠ in the schematic diagrams.
2. The primary source of X-ray radiation in this viewfinder is the picture tube. The tube used in the viewfinder is especially constructed to limit X-ray radiation emission. For continued X-ray radiation protection, the replacement tube must be same type as the original, CANON approved one.
3. When servicing, observe the original lead dress. If a short circuit is found, replace all parts which have been oberheated or damaged by the short circuit.
4. After servicing, see to it that all the protective devices such as insulation barriers, insulation papers shields are properly installed.
5. After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

5-1 Leakage Current Cold Check

1) Unplug the AC cord and connect a jumper between the two prongs on the plug.
2) Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metalic cabinet part on the equipment such as screwheads, connectors, control shafts, etc. When the exposed metalic part has a return path to the chassis, the reading should be between 1MΩ and 5.2MΩ. When the exposed metal does not have a return path to the chassis, the reading must be ∞.

5-2 Leakage Current Hot Check

1) Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.
2) Connect a 1.5KΩ 10 watt resistor, paralleled by 0.15μF capacitor, between each exposed metalic parts on the unit and a good earth ground such as a water pipe, as shown in the figure below.
3) Use an AC voltmeter, with 1000Ω/volt or more sensitivity, to measure the potential across the resistor.
4) Check all exposed metallic parts of the cover (Cable connection, Handle bracket, metallic cabinet. Screwheads, Metallic overlays, etc), and measure the voltage at each point.
5) Reverse the AC plug in the AC outlet and repeat each of the above measurements.
6) The potential at any point should not exceed 0.75V RMS.
   A leakage current tester (FLUKE MODEL: 8000A equivalent) may be used to make the hot checks.
   Leakage current must not exceed 0.5 milliamp.
   In case a measurement is out side of the limits specified, there is a possibility of a shock hazard, and corrective action must be taken before returning the instrument to the customer.

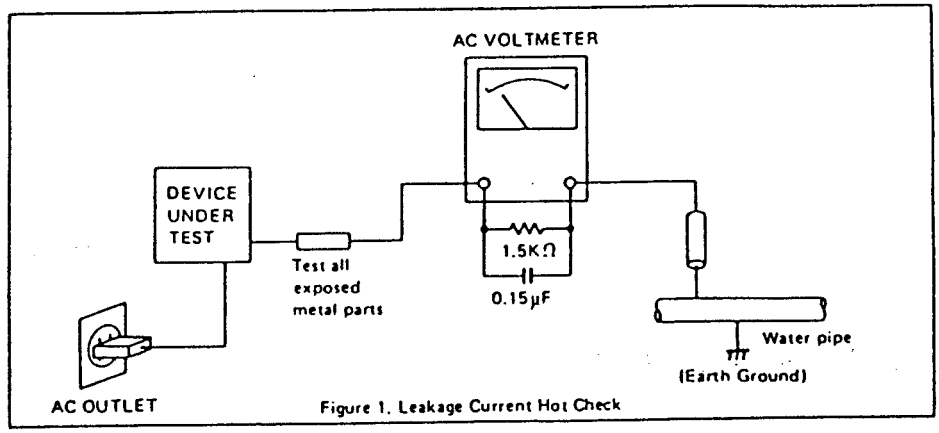

Figure 1. Leakage Current Hot Check

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CHAPTER I. GENERAL DESCRIPTION OF PRODUCT

1. Product Overview

The Model UC10 is a compact, lightweight 8 mm video camcorder featuring the inner-focus 8x zoom lens, highly integrated circuit configuration, low power consumption, dry-battery-driven operability, and an array of advanced digital title functions.

1-1 Major features

1) Superlative picture quality and excellent performance

- Inner-focus 8x zoom lens that allows automatic focusing in a range from 10 mm (wide-angle end) to infinity
- High-sensitivity, superb-performance 1/3-inch CCD with 320,000 pixels
- Auto white balancing on new principle of white extraction through 25-area split screen
- Automatic wind-swept-noise reduction in sound recording with microphone
- Center-weighted average metering to minimize an adverse effect due to backlight, and excellent backlight compensation
- Automatic iris level control to reduce flaring and color washing-out in such a high-luminance scene as night outdoor picture with conspicuous illuminations

2) Versatile functionalities

- Slantwise aliasing eliminated in frame display with the digital memory function
- Three-dimensional title presentation with the digital memory function; Scrolling/wiping visual effect in four directions
- Two-page-mixed animation-like presentation with the digital memory function
- Quick recording mechanism (just 0.2 second required to start shooting)
- Reshooting function
- Blank search function
- High-speed electronic shutter function (1/60, 1/125, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000 sec)
- Rechargeable lithium battery incorporated
- Four ways of power sources (battery pack, DC coupler, car battery adapter, size-AA alkaline dry batteries)

3) Ease of use

- Power focusing enabled even in AF mode
- Double-function keys
- Wireless remote controller of snap-on/off type
- Tally lamp/wireless remote controller turn-off function

1-2 Design features of each section

Table I-1 shows the unique design features of each section of Model UC10.

Table I-1

Lens section	Camera section			Recorder section					
	AF circuit	CCD	SENSOR and PROCESS circuit	AUDIO circuit	VIDEO circuit	SYSCON circuit	SERVO circuit	Mechanism	Power supply
8x inner-focus zoom lens	Based on E800 design.	1/3-inch CCD with 320,000 pixels	Based on A9 design.	Same as in conventional circuit (monophonic recording)	(Newly developed)	New developed	Based on E800 design.	UC mechanism based on MC-5 design.	Newly developed

1-3 External view and nomenclature

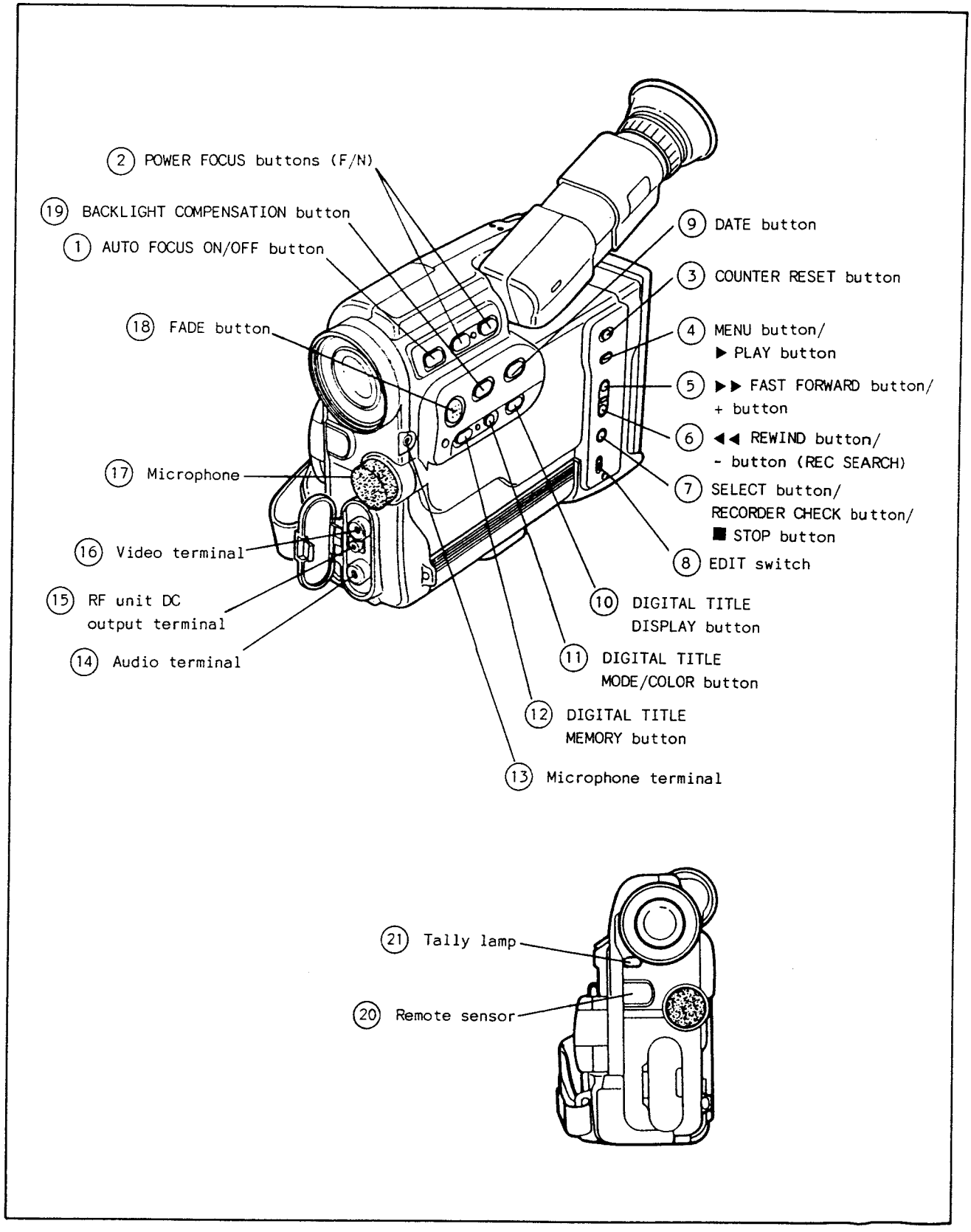

(2) POWER FOCUS buttons (F/N)
(19) BACKLIGHT COMPENSATION button
(1) AUTO FOCUS ON/OFF button
(18) FADE button
(17) Microphone
(16) Video terminal
(15) RF unit DC output terminal
(14) Audio terminal
(9) DATE button
(3) COUNTER RESET button
(4) MENU button/ ▶ PLAY button
(5) ▶▶ FAST FORWARD button/ + button
(6) ◀◀ REWIND button/ - button (REC SEARCH)
(7) SELECT button/ RECORDER CHECK button/ ■ STOP button
(8) EDIT switch
(10) DIGITAL TITLE DISPLAY button
(11) DIGITAL TITLE MODE/COLOR button
(12) DIGITAL TITLE MEMORY button
(13) Microphone terminal
(21) Tally lamp
(20) Remote sensor

Fig. I-1

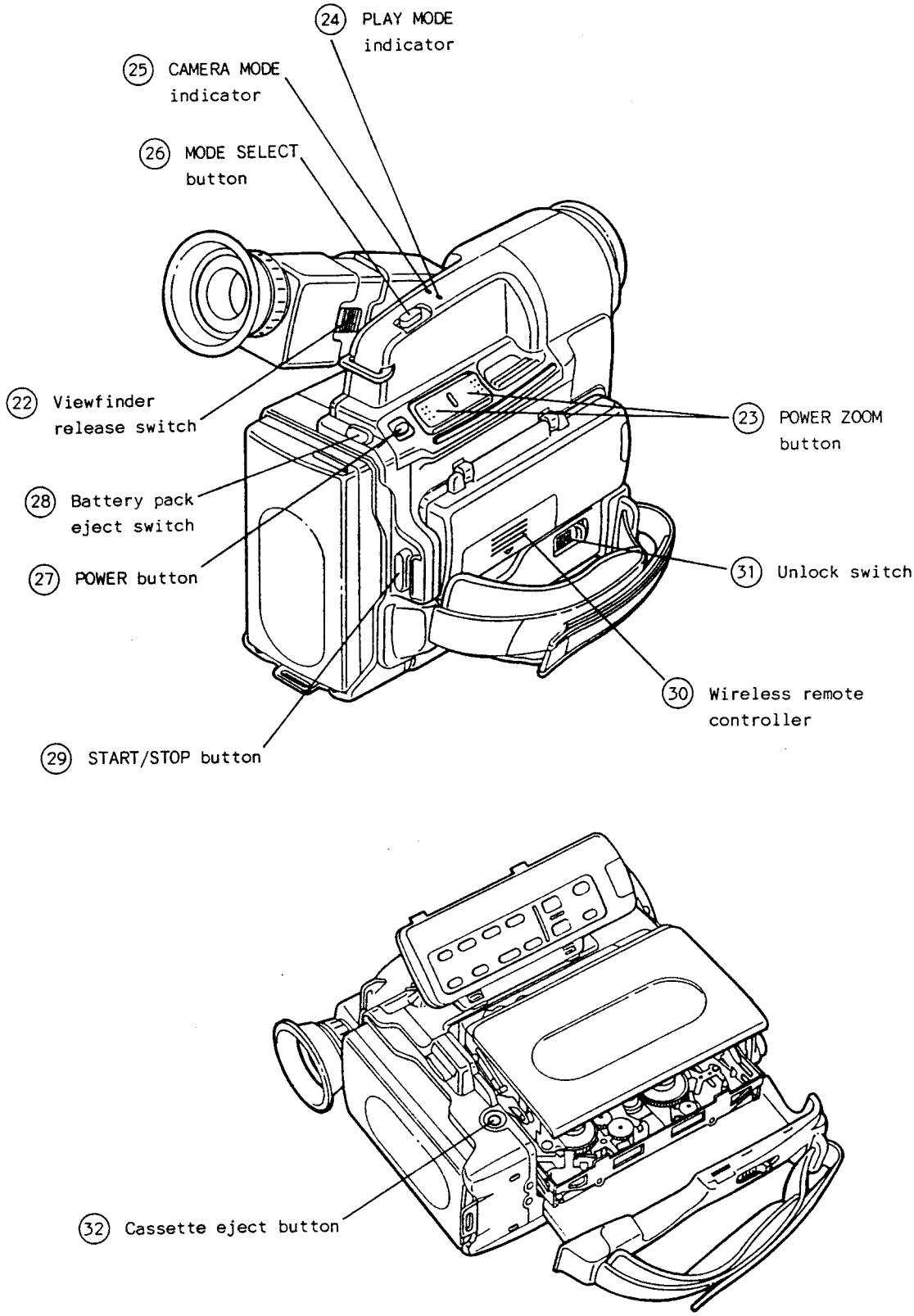

24 PLAY MODE indicator
25 CAMERA MODE indicator
26 MODE SELECT button
22 Viewfinder release switch
23 POWER ZOOM button
28 Battery pack eject switch
27 POWER button
31 Unlock switch
30 Wireless remote controller
29 START/STOP button
32 Cassette eject button

Fig. I-2

1-4 Brief description of control buttons, terminals and external parts

(1) AUTO FOCUS ON/OFF button

Each press of this button toggles between the auto focus mode and the power focus (manual focus) mode. When the power focus mode is selected, the AF rangefinding frame is not indicated on the viewfinder screen.

(2) POWER FOCUS buttons (F/N)

In the auto focus mode, press the AUTO FOCUS ON/OFF button and then F ◀ or N ▶ button (POWER FOCUS button). Thus, the manual focusing can be used.

Clicking the POWER FOCUS button within one second brings the subject into focus slowly; holding it down for more than one second brings the subject into focus promptly. When using the POWER FOCUS button, remember the following instructions:

° If the angle of view is changed by zooming after adjusting the focus, the subject goes out of focus in the scene. To avoid this, determine the angle of view first and then focus on the subject.

° If the ZOOM button is used during power focusing, the subject goes out of focus.

(3) COUNTER RESET button

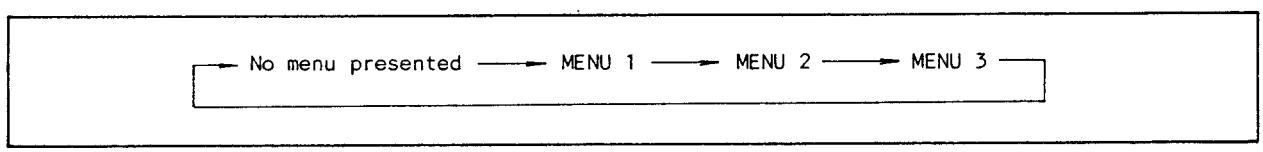
In other than the fast playback, reverse playback and high-speed search modes, pressing this button resets the linear time counter to zero (0:00:00).

(4) MENU button/▶ PLAY button

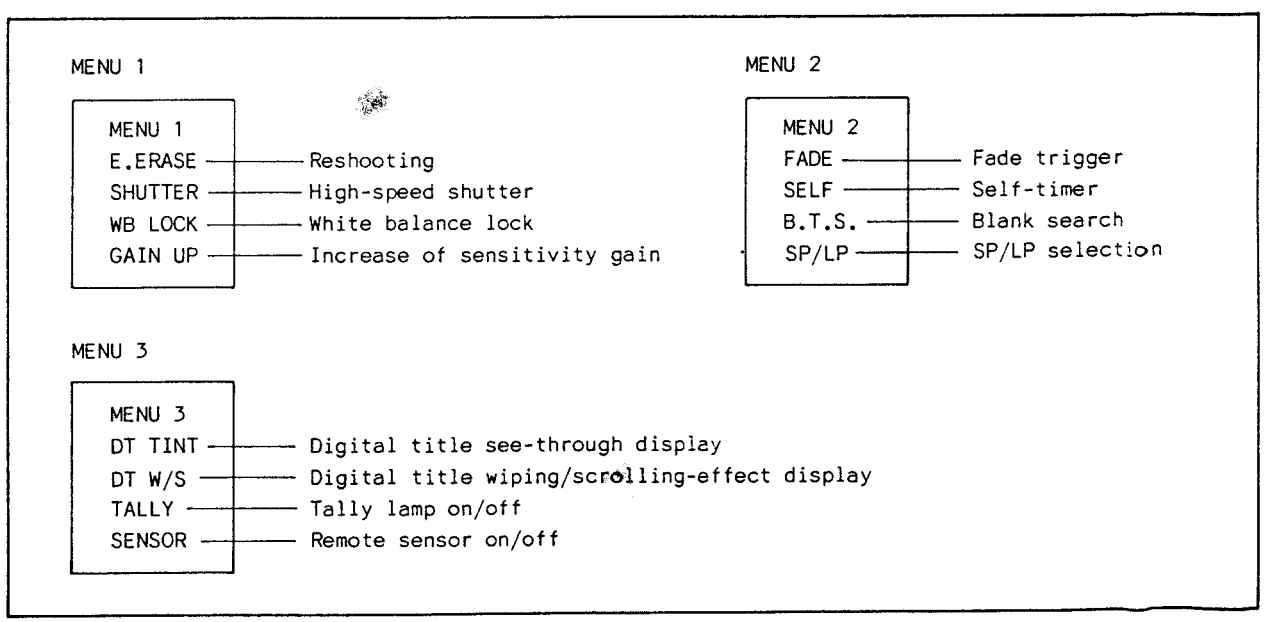
In CAMERA mode: Functions as MENU button.

Only the basic functions to be used frequently are provided as the buttons on camcorder body for ease of use. Other non-basic functions can be selected from the menus on viewfinder screen using the MENU button.

Each press of the MENU button flips through a total of three menu pages in a cyclic manner as indicated below.



On these three menu pages, the user can select and control the following functions.



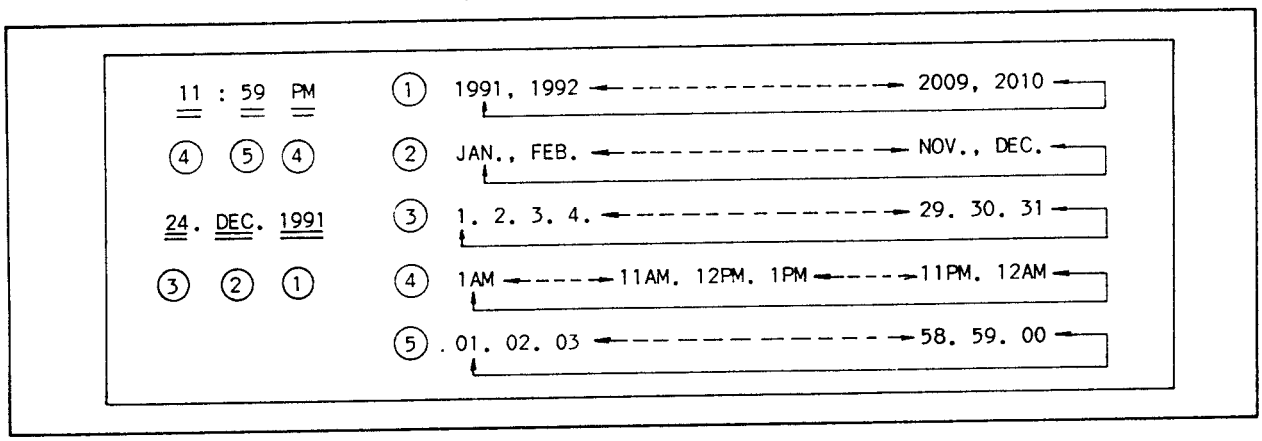
In PLAY mode : Functions as ▶ PLAY button.
Pressing this button starts playback operation.

⑤ ▶▶ FAST FORWARD button/+ button

In CAMERA mode: Functions as + button

° In the recording pause state, a forward picture search can be made by holding down this button. Releasing it sets up the recording pause state again.

° In auto date setting, 'year', 'month', 'day', 'hours' and 'minutes' can be changed by pressing this button.



° In menu item selection, the arrow cursor can be moved forawrd with this button.

In PLAY mode : Functions as ▶▶ FAST FORWARD button
Pressing this button in the stopped state causes the video tape to be fed fast. And, holding it down in the playback mode reproduces pictures forward rapidly at a speed of 7x fast motion. Also, by holding down this button during fast-forwarding, pictures can be searched forward rapidly at a speed of 11x fast motion at SP and 22x at LP.

⑥ ◀◀ REWIND button/- button

In CAMERA mode: Functions as - button.

° In the recording pause state, a backward picture search can be made by holding down this button. Releasing it sets up the recording pause state again.

° In auto date setting, 'year', 'month', 'day', 'hours' and 'minutes' can be changed by pressing this button.

° In menu item selection, the arrow cursor can be moded backward with this button.

In PLAY mode : Functions as ◀◀ REWIND button.
°Pressing this button in the stopped state rewinds the video tape. And, holding it down in the playback mode reproduces pictures in the reverse sequence rapidly at a speed of 5x fast motion. Also, by holding down this button during rewinding, pictures can be searched backward at a speed of 11x fast motion at SP and 22x at LP.

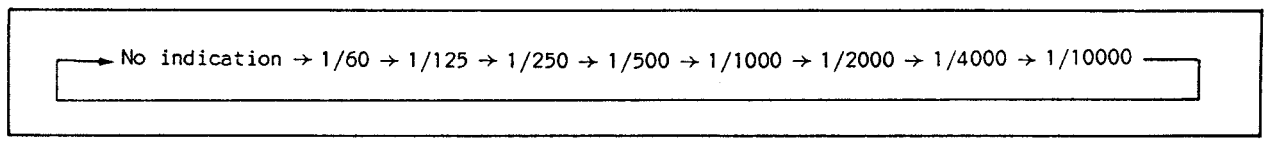
(7) SELECT button/RECORD CHECK button/■ STOP button

In CAMERA mode: Functions as SELECT button or RECORD CHECK button.

° In the recording pause state, pressing this button causes the tape be played back for approx. three seconds so that the user can check the recording on tape. Then, the recording pause state is set up again at the previous position on tape.

° If it is desired to reshoot during recording, set up the recording pause state before '*' mark disappears from the viewfinder screen. Press the MENU button (4). Then, while 'E.ERASE' is pointed at with the arrow cursor, press this button. Thus, the tape can be rewound to the start-of-shooting position automatically.

° On MENU 1, point at 'SHUTTER' with the arrow cursor using + button (5). Then, with this button, a shutter speed can be selected in a cyclic manner as indicated below.

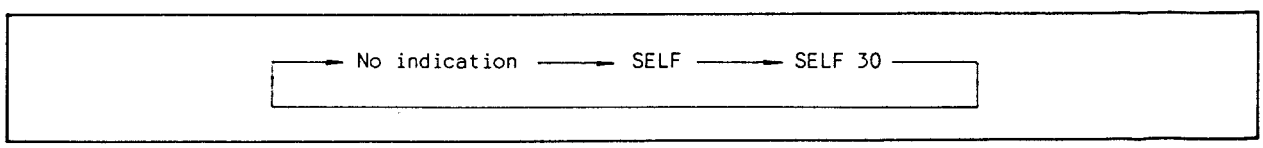


° On MENU 1, point at 'WB LOCK' with the arrow cursor using + button (5). Then, the auto white balance function can be locked/unlocked by pressing this button.

° On MENU 1, point at 'GAIN UP' with the arrow cursor using + button (5). Then, the sensitivity increase function can be made active by pressing this button. In dim indoor videographing, the GAIN UP function can increase sensitivity to record pictures clearly.

° On MENU 2, point at 'FADE T' with the arrow cursor, and press this button. 'FADE T' will then be indicated at the right on viewfinder screen. In this state, press the FADE button (18) to blink 'T'. Then, when the START/STOP button (29) is pressed to start recording, a picture is fadded in. Also, during recording, a picture can be faded out using this button.

° On MENU 2, point at 'SELF' with the arrow cursor using + button (5). Then, self-timer mode selection can be made by pressing this button as indicated below.

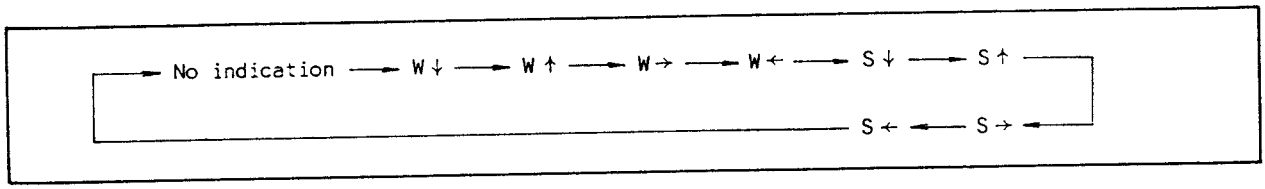


° On MENU 2, point at 'B.T.S.' with the arrow cursor using + button (5). Then, when this button is pressed, the end-of-recording position on tape is located in fast-motion search (pictures reproduced). The recording pause state is set up automatically at the end-of-recording position.

° On MENU 2, point at 'SP/LP' with the arrow cursor using + button (5). Then, the tape speed (SP/LP) can be selected by pressing this button.

° With a digital title being displayed, point at 'DT TINT' with the arrow cursor on MENU 3. Then, by pressing this button, the digital title color indication is enclosed in a pair of angle brackets < >, i.e. the see-through mode is set up. Pressing this button again makes the angle brackets disappear to cancel the see-through mode.

° On MENU 3, point at 'DT W/S' with the arrow cursor using + button (5). Then, the scrolling/wiping effect can be given in one of four directions by pressing this button.



° On MENU 3, point at 'TALLY' with the arrow cursor using + button (5). Then, when this button is pressed, 'T OFF' appears at the right on viewfinder screen. In this state, the tally lamp remains off during video shooting. (During receiving the infrared-light signals from remote controller, the lamp is lit up.)

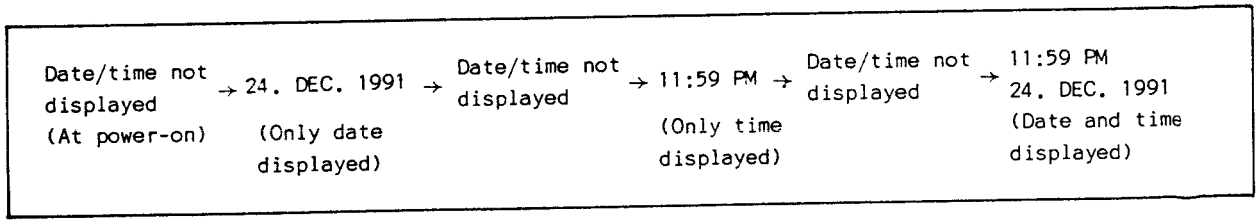
° On MENU 3, point at 'SENSOR' with the arrow cursor using + button (5). Then, when this button is pressed, 'S OFF' appears at the right on viewfinder screen. In this state, the remote control sensor remains inactive.

° Press the DATE button (9), and change 'year', 'month', 'day', 'hours' and 'minutes' using + button (5) or - button (6). Then, the correct date and time can be set by pressing this button.

In PLAY mode : Functions as ■ STOP button.
Pressing this button causes tape drive to stop.

(8) EDIT switch
Used for editing pictures recorded on videotape. turn on this switch only for editing in the PLAY mode. Possible deterioration of picture quality can be minimized by turning on this switch. In a common practice, keep it turned off.

(9) DATE button
° Pressing this button displays the date and/or time on the viewfinder screen as indicated below.


Date/time not displayed (At power-on)
24. DEC. 1991 (Only date displayed)
Date/time not displayed
11:59 PM (Only time displayed)
Date/time not displayed
11:59 PM 24. DEC. 1991 (Date and time displayed)

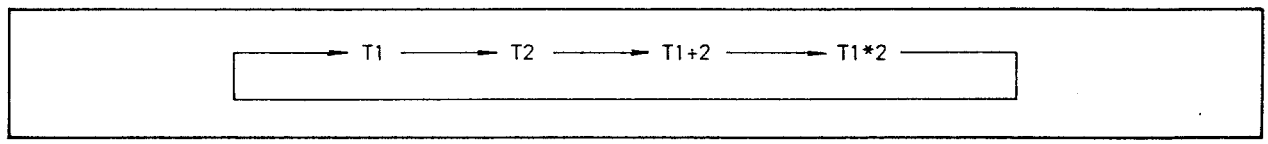
° On the CAMERA mode, the date setting state can be selected by holding this button for approx. three seconds. Then, the exact date and time can be set using + button (5), - button (6) and SELECT button (7).

⑩ DIGITAL TITLE DISPLAY button

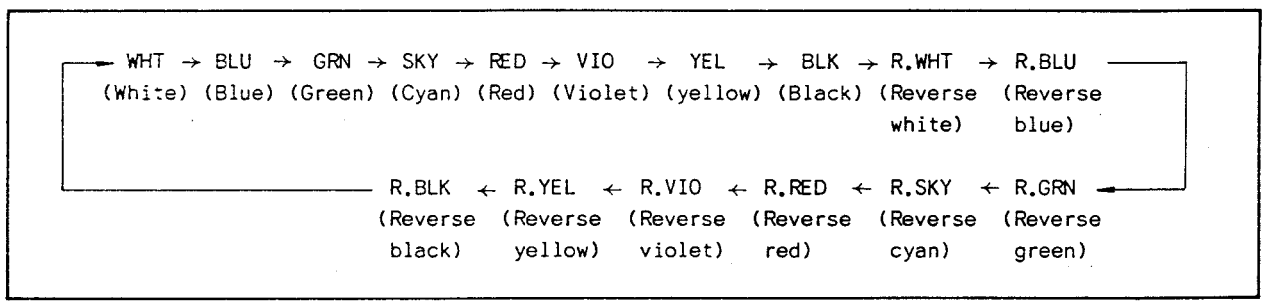
Pressing this button turns on/off a digital title on the scene being videographed. Also, the scrolling/wiping effect selected on MENU 3 (in one of four directions) can be made with this button.

⑪ DIGITAL TITLE MODE/COLOR button

° When a digital title is not displayed, pressing this button changes over the title memory/display mode as indicated below.



° When a digital title is displayed, its color can be changed using this button. Each press of this button changes the color of title in a cyclic manner as indicated below.



° With a digital title displayed, pressing this button for more than three seconds sets up the shadow mode in which title characters are shadowed. Pressing it again for more than three seconds cancels the shadow mode.

⑫ DIGITAL TITLE MEMORY button

Pressing this button lets the internal memory store any image digitally. Also, by holding down this button, the user can gradually change the contrast of image to be stored. This function is convenient to adjust an image having too low or high contrast. While this button is held down, the contrast of image is increased in eight steps from the original state and then increased in 16 steps from the lowest contrast state. The contrast change sequence is performed in monochrome (without color).

⑬ Microphone terminal

Used for connecting the optional microphone.

⑭ Audio terminal

Used for audio output.

⑮ RF unit DC output terminal

Used for supplying +5 V power to the RF unit RU-100.

⑯ Video terminal

Used for video output.

⑰ Microphone

Nondirectional microphone.

⑱ FADE button
In the CAMERA mode, holding down this button causes the picture and sound to disappear gradually (fade-out). When it is released, they appear gradually (fade-in). White fading can thus be provided. Note that this white-fading function is not interlinked with the START/STOP button.

⑲ BACKLIGHT COMPENSATION button
While this button is held down, compensation can be made for exessive backlight in the scene being videographed.

⑳ Remote sensor
Infrared-light signals from the remote controller are received through this window. The signal-receivable range is approx. 30 degrees on each of the left and right angular sides and approx. 15 degrees on each of the upper and lower angular sides (with respect to the face of remote sensor). The maximum remote-control distance is five meters.

㉑ Tally lamp
The tally lamp flashes during camera recording operation or self-timer operation. It lights up steadily when the remote control signal is received.

Camera recording operation ..... ON for 0.5 sec, OFF for 0.5 sec Self-timer active state ..... ON for 0.5 sec, OFF for 1.5 sec Remote control signal received ... Lights up steadily.

㉒ Viewfinder release switch
This switch appears when the eyepiece adapter is pulled from the viewfinder until it is stopped. To remove the eyepiece adapter, hold down this switch.

㉓ POWER ZOOM button
With this button, the angle of view (frame) can be changed continuously in a range from wide-angle end to telephoto end.

㉔ PLAY MODE indicator
This green indicator lights up when the PLAY mode is selected. When the voltage level of battery decreases down to the lower limit, moisture condensation takes place or any error occurs in operation, this indicator flashes to provide warning.

㉕ CAMERA MODE indicator
This red indicator lights up when the CAMERA mode is selected. When the voltage level of battery decreases down to the lower limit, moisture condensation takes place or any error occurs in operation, this indicator flashes to provide warning.

㉖ MODE SELECT button
Each press of this button toggles between the PLAY mode and the CAMERA mode.
The functions of buttons ④, ⑤, ⑥ and ⑦ can be changed with PLAY/CAMERA mode selection using this button.

㉗ POWER button
Used for turning power on/off.

㉘ Battery pack eject switch
To take the battery pack out of its box, press this switch.

(29) START/STOP button

In CAMERA mode: When this button is pressed in the recording pause state, the recording operation is resumed. Pressing it again causes the camcorder to get back to the recording pause state.
In the self-timer mode, the self-timer can be started/canceled using this button.

In PLAY mode : When this button is pressed during playback, the picture is made still.

(30) Wireless remote controller

The wireless remote controller can be used with it mounted on the camcorder or with it detached from the camcorder. When using this controller mounted on the camcorder, pull it upward. (Note that the controller may not function if there is no reflecting thing within a distance range of 3 meters.) When this controller is detached from the camcorder, use it within a distance range of 5 meters.

(31) Unlock switch

To take out the vieotape cassette, press this switch, open the cassette holder cover and press the cassette eject button (32).

(32) Cassette eject button

With the cassette holder cover opened (by pressing the unlock switch (31)), the videotape cassette can be ejected by pressing this button in other than the recording mode. Even in the power-off state, the user can take out the videotape cassette (with the battery attached).

1-5 Information display on electronic viewfinder

The electronic viewfinder in Model UC10 lets the user readily know a repertoire of current statuses and settings. It displays the camera operating status, recorder operating status, warning message, etc. Still more, the user can select the auto date/title display mode, timer setting mode or menu mode at a touch of the button.

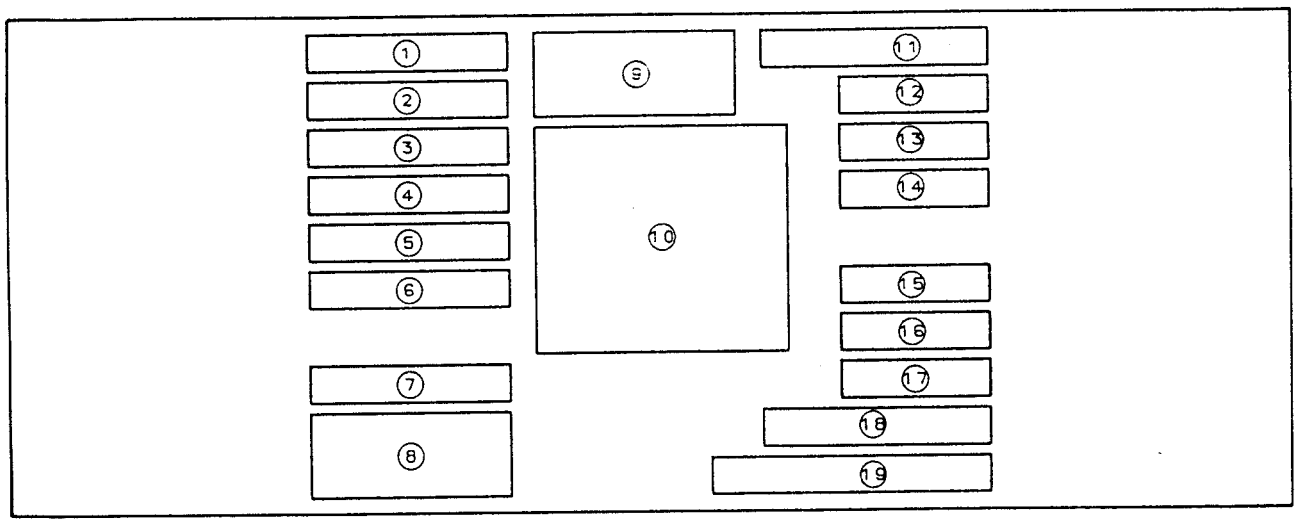


Fig. I-3

Table I-2 (1/3)

No.	Item	Display	Description
①	White balance mode	No indication WB LOCK	When the full-auto white balance is selected. When the white balance function is locked.
②	High speed shutter mode	No indication 1/60 1/125 1/250 1/500 1/1000 1/2000 1/4000 1/10000	With selection of normal shutter speed (1/50 sec.) With selection of shutter speed of 1/60 sec. With selection of shutter speed of 1/125 sec. With selection of shutter speed of 1/250 sec. With selection of shutter speed of 1/500 sec. With selection of shutter speed of 1/1000 sec. With selection of shutter speed of 1/2000 sec. With selection of shutter speed of 1/4000 sec. With selection of shutter speed of 1/10000 sec.
③	Increase of sensitivity gain	No indication GAIN UP	Normal sensitivity When sensitivity gain is increased.
④	Digital title display mode	T1 T2 T1+2 T1*2 ␣␣␣␣W ↓ ␣␣␣␣W ↑ ␣␣␣␣W → ␣␣␣␣W ← ␣␣␣␣S ↓ ␣␣␣␣S ↑ ␣␣␣␣S → ␣␣␣␣S ←	When only digital title 1 is displayed. When only digital title 2 is displayed. When digital titles 1 and 2 are mixed. When digital titles 1 and 2 are displayed alternately. For downward wiping of digital title. For upward wiping of digital title. For rightward wiping of digital title. For leftward wiping of digital title. For downward scrolling of digital title. For upward scrolling of digital title. For rightward scrolling of digital title. For leftward scrolling of digital title.

Table I-2 (2/3)

No.	Item	Display	Description
⑤	Color/mode of digital title 1 <Normal>	WHT, BLU, GRN, SKY, RED, VIO, YEL, BLK	White, blue, green cyan, red, violet yellow, black
	<Reverse>	R.WHT, R.BLU, R.RED, R.VIO R.YEL, R.BLK	R.··· means that a digital title is displayed in reverse video.
	<See-through>	< WHT >< BLU > < GRN >< SKY > < RED >< VIO > < YEL >< BLK >	< ... > indicates a see-through digital title.
	<Reverse see-through>	< R.WHT > < R.BLU > . . .	< R. ··· > means that a see-through digital title.
⑥	Color/mode of digital title 1 <Normal> <Reverse> < See-through > <Reverse see-through>	Same as in ⑤	Same as in ⑤
⑦	Tape speed selection	SP LP	Standard play Long play
⑧	Main operation	REC. PAUSE No indication REC. PLAY STILL STOP FF RWD EJECT EJECT(Blinking) *	When the recording pause mode is selected. When the search, high-speed fast-forward playback, high-speed rewind playback, or record review function is activated. When the recording operation is selected. When the playback, fast-forward playback or fast rewind playback function is activated. When the still playback function is activated. When the camcorder is stopped. When the videotape is forwarded fast. When the videotape is rewound. When the vidotape cassette is ejected. On occurrence of an error. When reshooting is allowed.
⑨	Timer indication	0SEC ∿ 10SEC 10SEC ∿ 1SEC 30SEC ∿ 1SEC	Counting down for 10 seconds from the moment the recording is indicated. Standby state of self-timer function Counting down for 30 seconds from the moment the self-timer recording is started.
		SELF SELF 30	When self-timer recording is set. When 30-sec self-timer recording is set.

Table I-2 (3/3)

No.	Item	Display	Description
⑩	Menu display < Menu page 1 >	MENU 1 E.ERASE SHUTTER WB LOCK GAIN UP	Menu page 1 is displayed. For reshooting. For high-speed shutter selection. For white balance lock/unlock For increase of sensitivity gain. } Selectable with the arrow cursor ➡ .
	< Menu page 2 >	MENU 2 FADE T SELF B.T.S. SP/LP	Menu page 2 is displayed. For fading interlinked with trigger. For self-timer operation. For blank search. For selecting tape speed (SP/LP) } Selectable with the arrow cursor ➡ .
	< Menu page 3 >	MENU 3 DT TINT DT W/S TALLY SENSOR	Menu page 3 is displayed. For see-through digital title display. For wiping/scrolling effect of digital title. For turning on/off the tally lamp. For turning on/off the remote sensor. } Selectable with the allow cursor ➡ .
⑪	Counter value	-9:59:59 ↕ 0:00:00 ↕ 9:59:59	Hours:minutes:seconds
⑫	Tape status	TAPE (Blinking) T. END	When the videotape is not loaded. When the end of videotape is reached in recording.
⑬	Battery status	BATT (Blinking)	When the battery voltage becomes lower than the predetermined level.
⑭	Dew (moisture condensation)	DEW (Blinking)	On occurrence of moisture condensation.
⑮	Fade mode	No indication FADE T ('T' blinking)	Normal fading Fading interlinked with trigger.
⑯	Tally lamp mode	No indication T OFF	When the tally lamp function is enabled. When the tally lamp function is disabled.
⑰	Remote control mode	No indication S OFF	When the remote control function is turned on. When the remote control function is turned off.
⑱	Time	12:00 AM ∿ 11:59 PM	The current time is displayed.
⑲	Date	1. JAN. 1991 ∿ 31. DEC. 2010	The current date is displayed.

1-6 UC10 video system chart

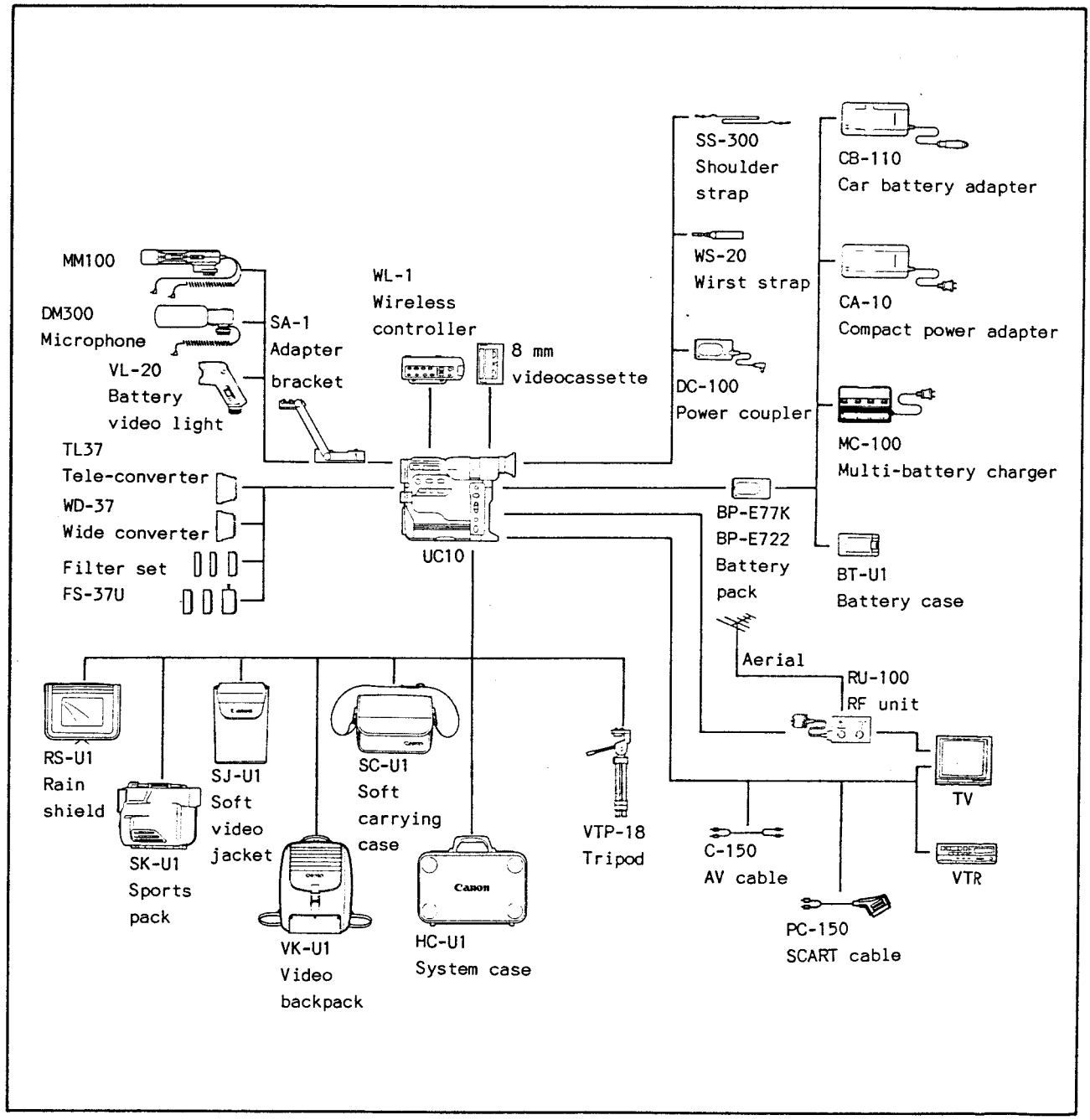


Fig. I-4

2. New Technology

2-1 Lens section

2-1-1 Inner-focus zoom lens

Model UC10 is equipped with the 8x inner-focus zoom lens assembly for further reduction in size and weight. This inner-focus zoom lens assembly is Canon's second design version succeeding that in the predecessor E6.

The inner-focus zoom lens arrangement makes it possible to shorten the closest focusable distance (minimum object distance). Because of complexity in relay lens control, however, it is required to use the electronic cam system (with the microcomputer, relay-lens-drive stepping motor, and zoom encoder).

For reduction in size and weight of lens assembly, the following design approaches may be taken; (1) decrease in the number of component lenses, and (2) decrease in diameter of each lens. In principle, however, the optical performance is degraded by decreasing the number of component lenses or making the diameter of each lens smaller.

In the 8x inner-focus zoom lens system of this camcorder, two aspherical lenses are arranged to decrease the number of component lenses without sacrificing optical performance. This aspherical lens design has realized substantial reduction in weight and size (glass weight ... 10.25 g, entire length from the first lens to the focal plane ... 58.8 mm)

Illustrated below is the compact optical geometry of the 8x inner-focus zoom lens assembly incorporated in Model UC10. The two aspherical lenses are hatched in this figure. The aspherical lens located at the center position contributes to significant reduction in the entire length, and that located at the rear serves for effective compensation of aberration.

In the inner-focus lens system of Model E6, the front lens was shifted for zooming (the front lens was moved forward by approx. 15 mm for positioning to telephoto end). Unlike this, the inner-focus lens system of Model UC10 does not shift its front lens for zooming.

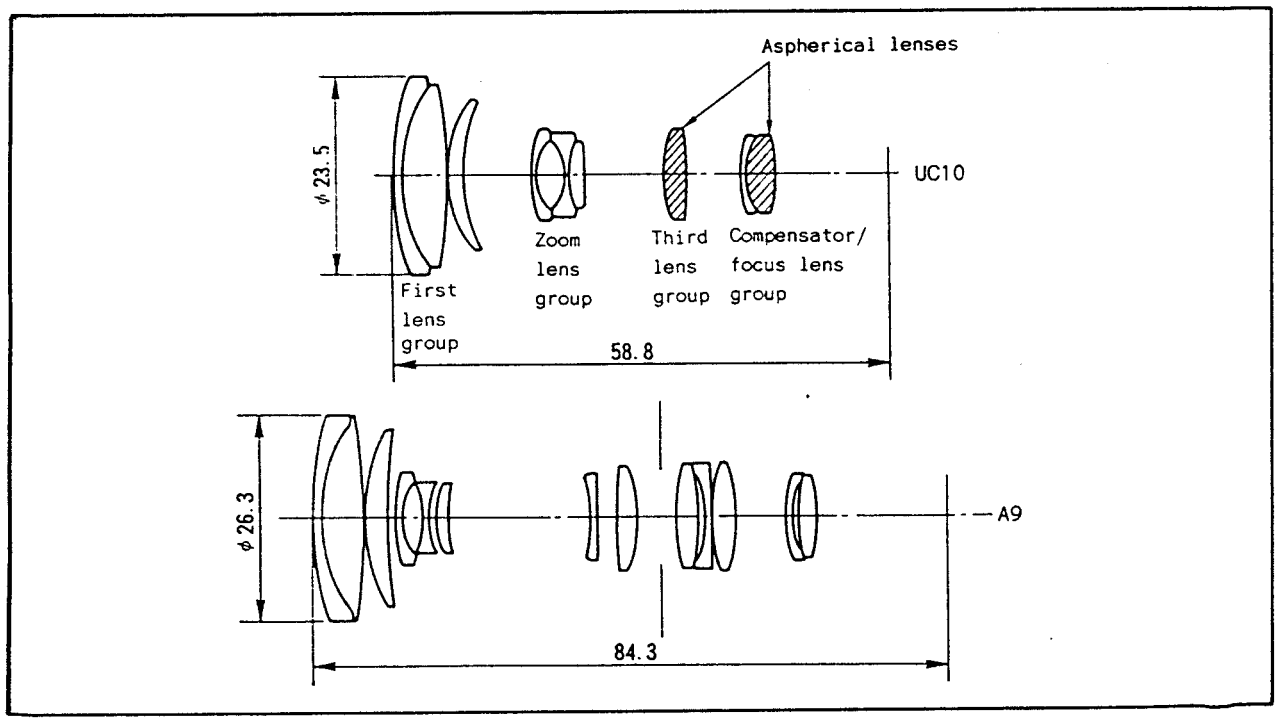


Fig. I-5

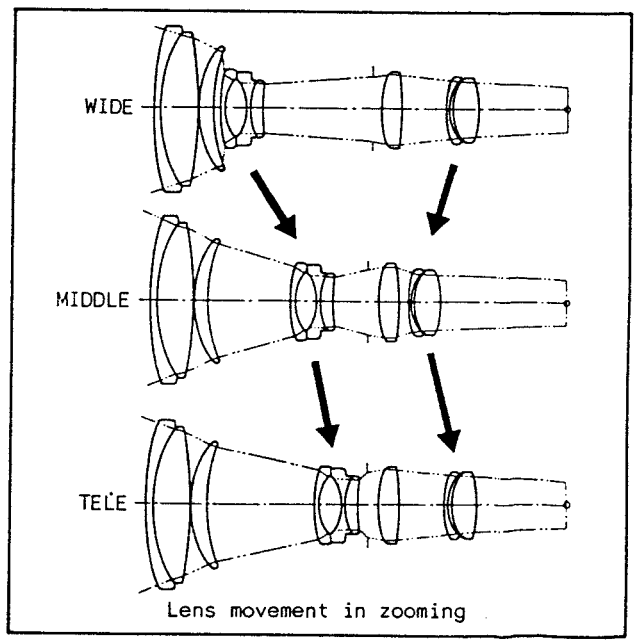
Table I-3 compares the lens unit specifications of Model UC10 and predecessors.

Table I-3

	UC10	E6	A9	A10
Focal length, Zoom ratio	6.0 to 48 mm, 8x	9.0 to 54 mm, 6x	7.0 to 56 mm, 8x	8.5 to 68 mm, 8x
Aperture ratio (at telephoto end)	F1.8 (F2.6)	F1.8	F1.8	F2.0
Size of CCD image sensor	1/3 inch	1/2 inch	1/3 inch	1/2 inch
Lens composition	7 groups consisting of 9 lenses	10 groups consisting of 12 lenses	12 groups consisting of 13 lenses	12 groups consisting of 14 lenses
Aspherical lenses	2 aspherical lenses used	None	None	None
Focusing principle	Inner-focus principle	Inner-focus principle	Front-focus principle	Front-focus principle
Lens glass weight	10.25 gr	21.8 gr	21.23 gr	25.11 gr
Optical length	58.8 mm	66.8 mm	84.3 mm	89.6 mm
Unit weight	Approx. 48 gr	Approx. 110 gr	Approx. 137 gr	Approx. 96 gr

To reduce the aberration and the number of component lens, the first and the third lens groups are fixed, and the aspherical lens are adopted for the third and the fourth lens groups' component lens.

The variator of second lens group is screw-driven linearly. As the compensator lens of fourth lens group is served also as the focusing lens, the moving trails in zooming differs according to the subject's distance.



Lens movement in zooming

Fig. I-6

In the electronic cam system of this camcorder, the compensator lens also serves as a focusing lens similarly to Model E6. Therefore, the compensator lens moves along different trajectories during zooming operation according to the object distance. The microcomputer is used to store multiple cam trajectories as data values. According to the object distance, a proper cam trajectory is selected under control of the microcomputer for moving the compensator lens.

Figure I-8 shows the multiple cam trajectories to be selected according to the object distance.

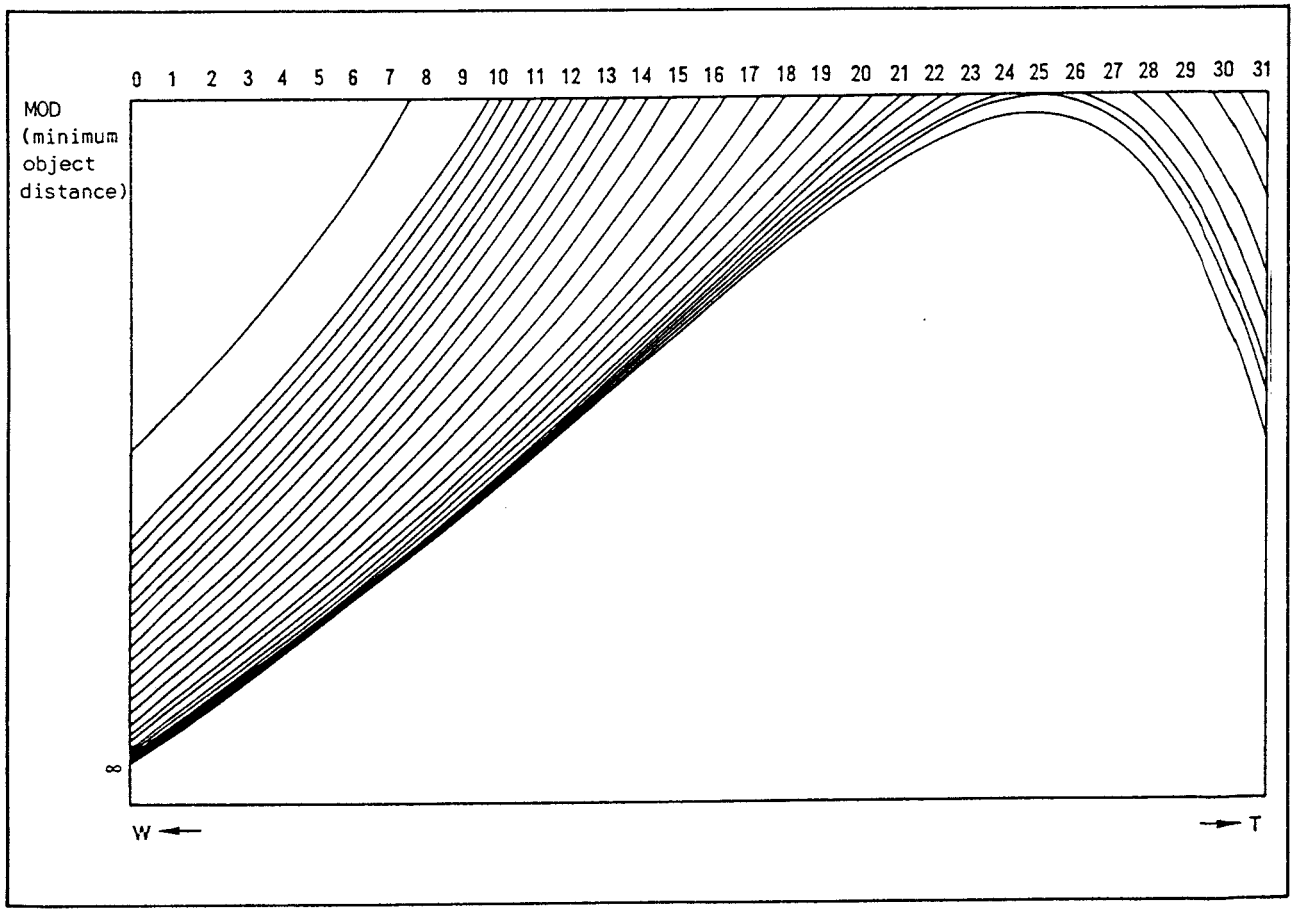


Fig. I-8

In principle, the electronic cam system works using these cam trajectories stored in the microcomputer. With this arrangement only, however, the compensator lens cannot trace the cam trajectories accurately.

In this camcorder, the 'edge-spread focusing + fuzzy-logic control' method is employed to carry out cam trajectory changeover and speed regulation for minimizing image blur during zooming operation.

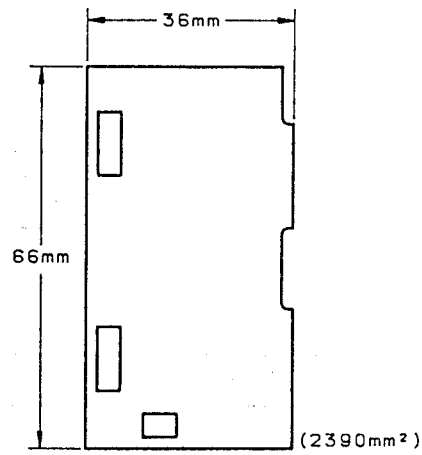
2-2 Camera section

2-2-1 High-density circuit boards

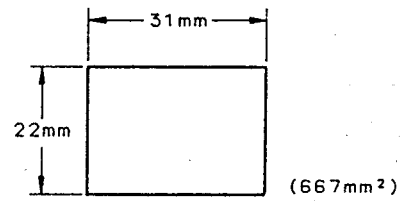
The image sensor circuit of this camcorder is formed on the low-temperature-baked ceramic board consisting of six layers. This image sensor circuit board incorporated in the camera section comprises the CCD drive circuit and the signal processing circuit for handling CCD output signals. The size of this circuit board is smaller than half of the conventional one.

The highly reliable circuit parts of the smallest type available at present (ICs, crystal oscillators, LC traps, connectors, etc.) are mounted on the low-temperature-baked ceramic board for for reduction in physical dimensions.

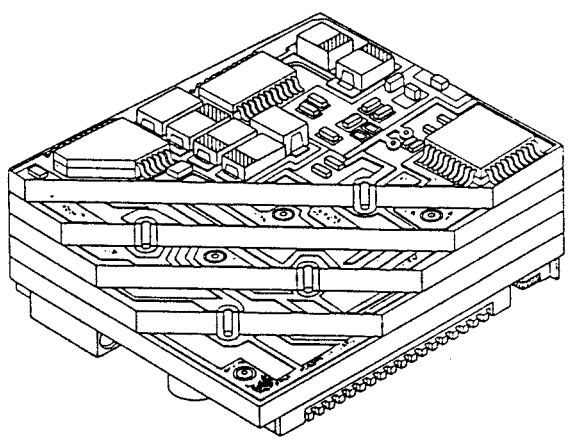
Comparison of image sensor circuit board



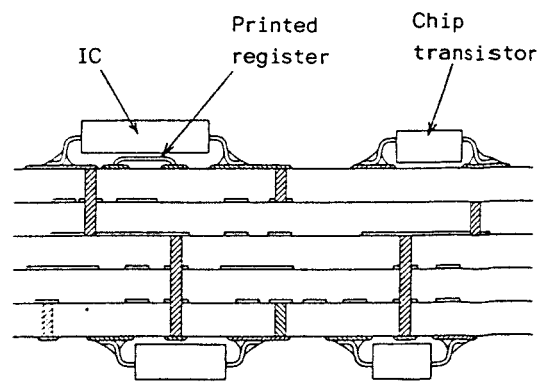
(A10)



(UC10)



Cross-sectional view



Structural cross-section

Fig. I-9

2-2-2 Integration of camera peripheral circuits

The conventional camera peripheral circuits consisting of such electrical parts as general-purpose operational amplifiers and digital ICs are further integrated to decrease the number of component parts. Thereby, reduction in the size of circuit board is realized.

1) PROCESS IC

The knee circuit, white clip circuit, 8dB amplifier circuit, etc. are integrated in the PROCESS IC.

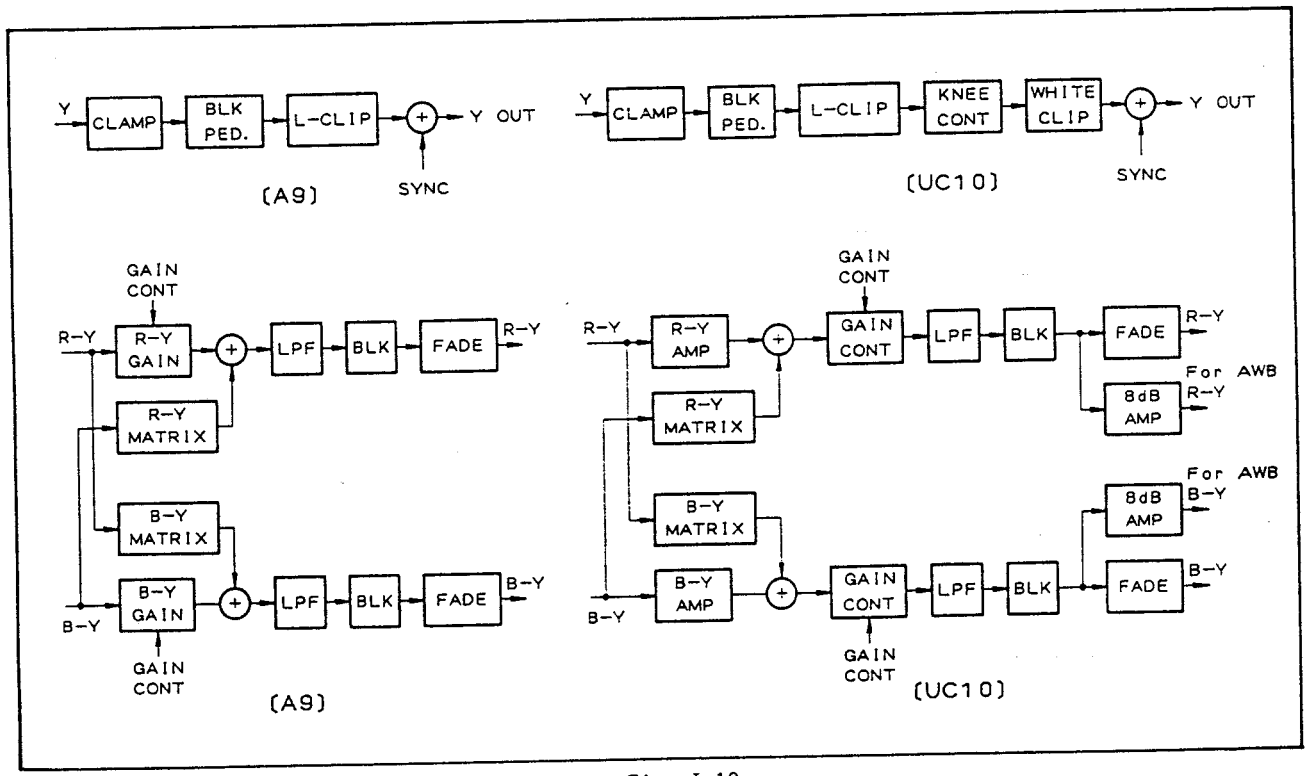


Fig. I-10

2) PROCESS SUB IC

This IC contains the encoder circuit, chroma suppression circuit, and the electronic voltage control circuits for AWB, AE and AGC adjustment.

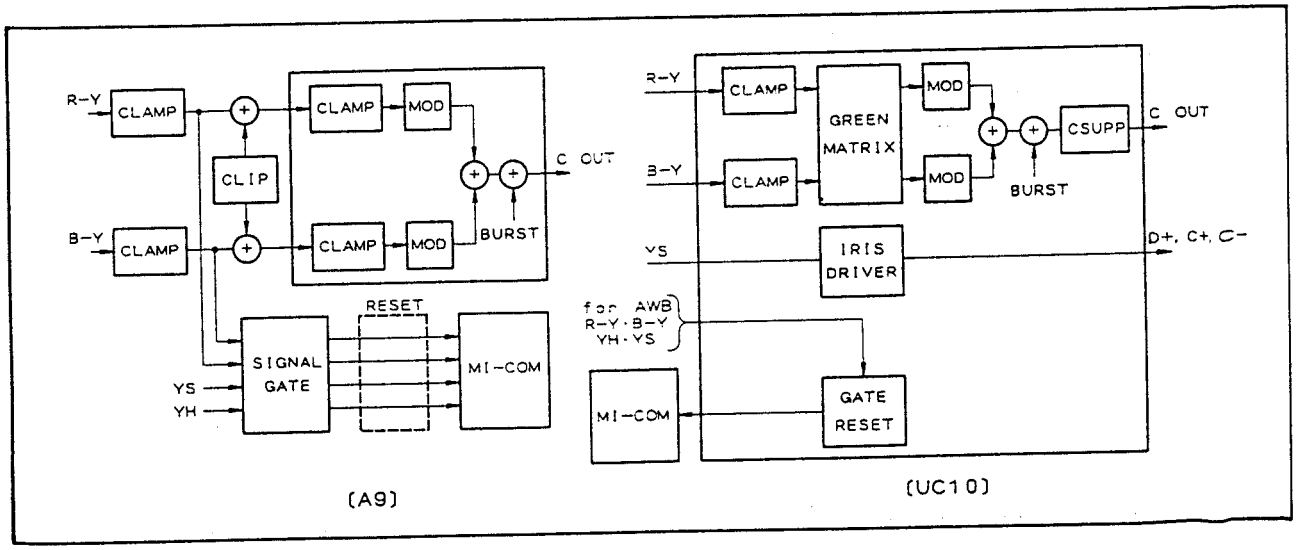


Fig. I-11

3) AUTOFOCUS IC

The two conventional analog and digital ICs are integrated into one microchip. Also, instead of the filter consisting of inductor and capacitor in the conventional arrangement, the active filter is configured in the operational amplifier.

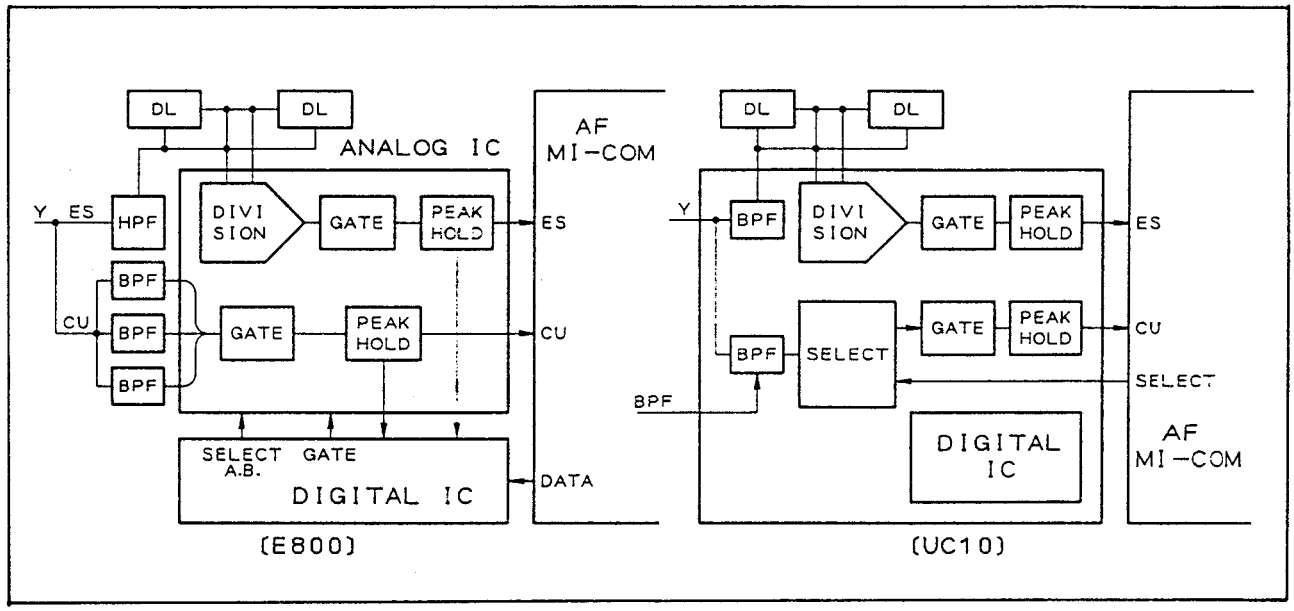


Fig. I-12

4) DIGITAL MEMORY IC

The digital memory control circuit and S-RAM are integrated in this IC.

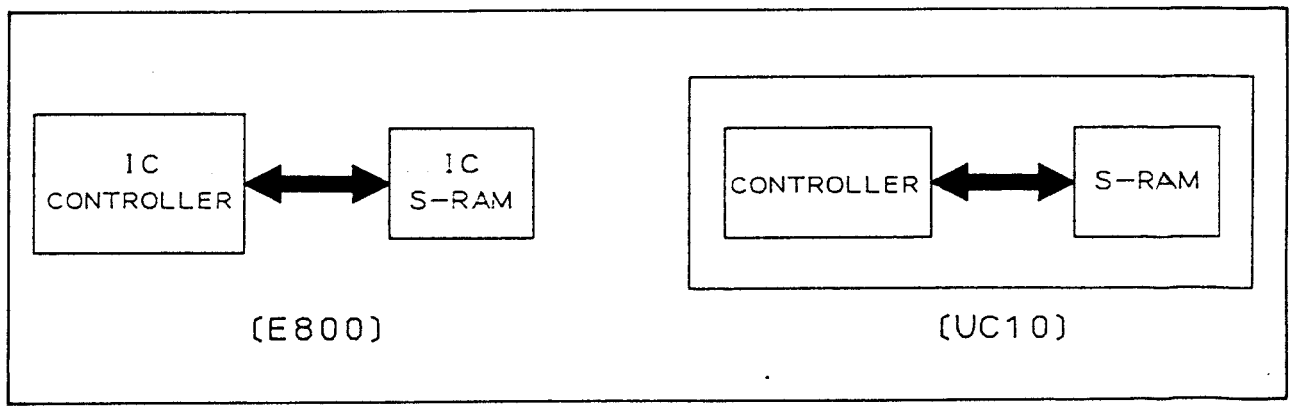


Fig. I-13

5) Lower power consumption

Integration of the camera peripheral circuits also contributes to reduction in power consumption.

(1) The optimum current setting is allowed through integration of the circuits consisting of general-purpose operational amplifiers and general-purpose digital ICs.

(2) The sample-hold IC and 1H delay IC, which require +9 V power in the conventional design, are driven with +4.8 V.

Thanks to substantial integration of the camera peripheral circuits, the power consumption in the camera section of this camcorder is reduced to approx. 1.4 W, i.e. approx. 26% lower than that in Model A10.

2-2-3 Digital title functions

The digital title functions incorporated in this camcorder are designed to let the user enjoy more sophisticated videographing. In addition to function enhancement, the digital title circuit is configured in smaller size by using he S-RAM built-in IC.

For allowing the user to create higher-quality video pictures, the following functional features are provided; three-dimensional (shadowed) digital titling, frame display of digital titling, and double-page titling that enables two-color or animation-like presentation.

[Digital title features available in Model UC10]

- Three-dimensional (shadowed) title
- Frame display
- Two title pages
- Mixing of two title pages
- Animation-like title
- Scrolling/wiping effect

} New features

- Reverse video display
- See-through display
- Variable take-in level

1) Three-dimensional (shadowed) title

The shadowed characters can be created for three-dimensional titling. With this function, the title signal is widened vertically and horizontally to provide shadowing as shown in Fig. I-14.

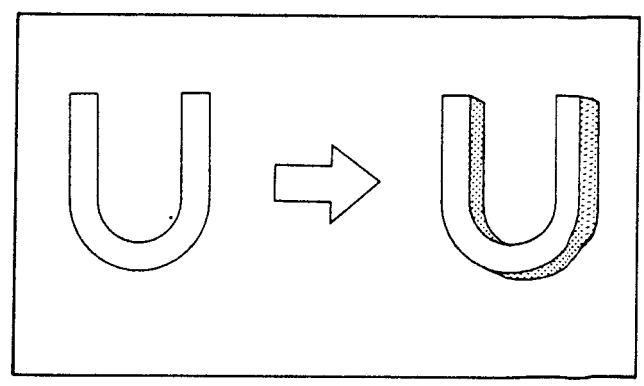


Fig. I-14

2) Frame display

In the conventional mode, a digital title was generated using the field memory in which the slanted outline of title character was stored stepwise. This might degrade the quality of videograph.

For improvement in title generation, the digital title circuit of this camcorder carries out frame (interlaced) scanning through pattern recognition and interpolation processing, thereby eliminating slantwise jaggies.

In principle, using the edge positions of lines n and n+1 in odd-numbered field, an edge data value representing the intermediate position between these positions is generated and output as line n' in even-numbered field.

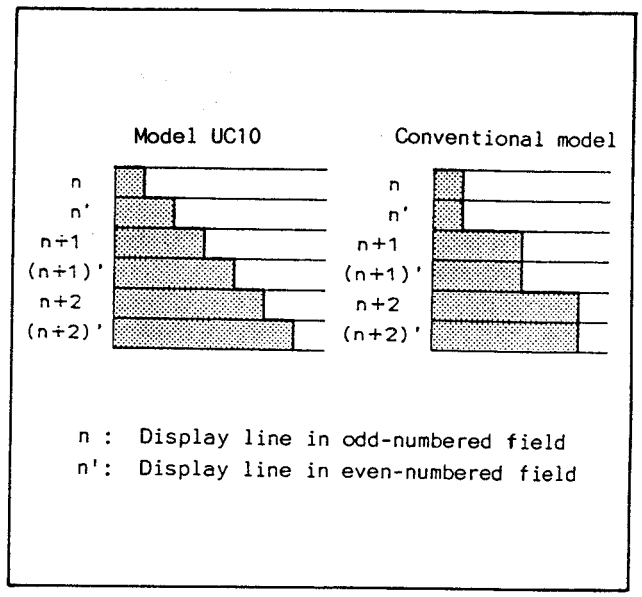


Fig. I-15

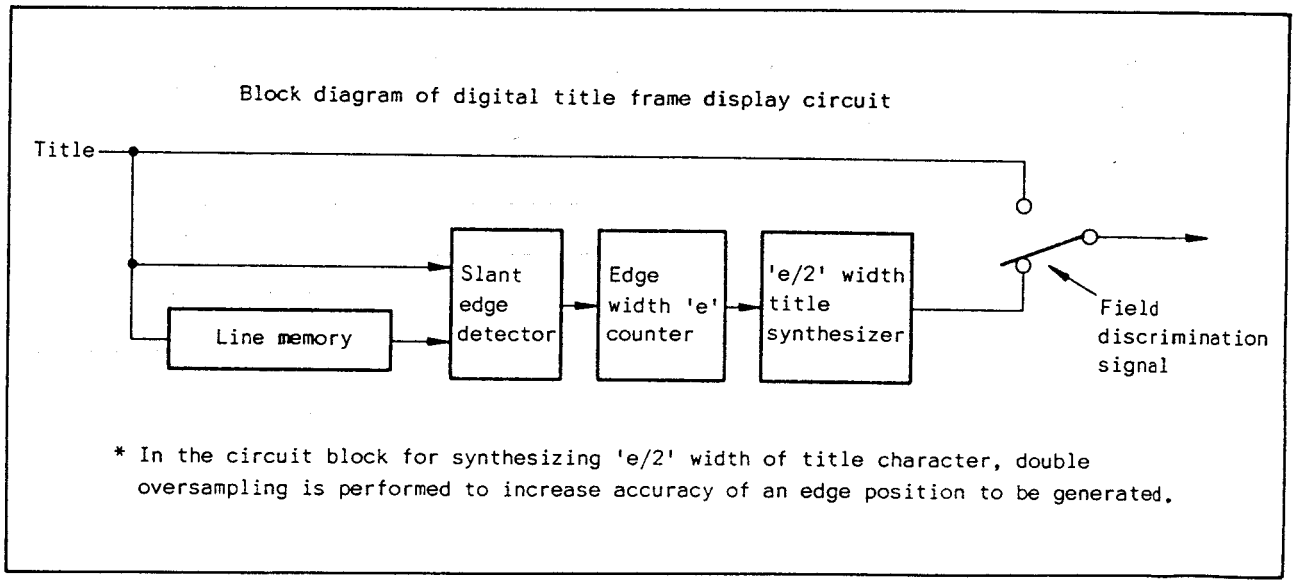

Block diagram of digital title frame display circuit
Title
Line memory
Slant edge detector
Edge width 'e' counter
'e/2' width title synthesizer
Field discrimination signal
* In the circuit block for synthesizing 'e/2' width of title character, double oversampling is performed to increase accuracy of an edge position to be generated.

Fig. I-16

3) Mixing of two title pages

Title pages 1 and 2 can be displayed mixedly. For instance, a two-color title can be created by mixing the red title on page 1 and the green title on page 2.

Note that title page 1 is superimposed on title page 2.

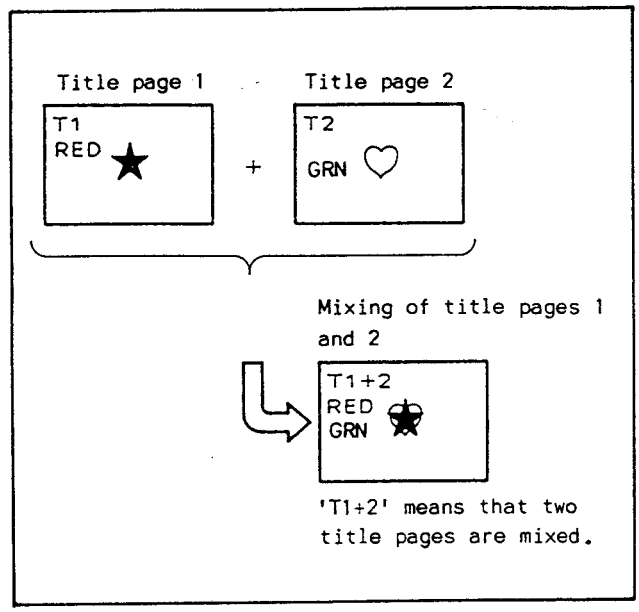


Fig. I-17

4) Animation-like title

Title pages 1 and 2 can be displayed alternately in a cycle of approx. 0.5 sec. This provides animation-like visual effect in titling.

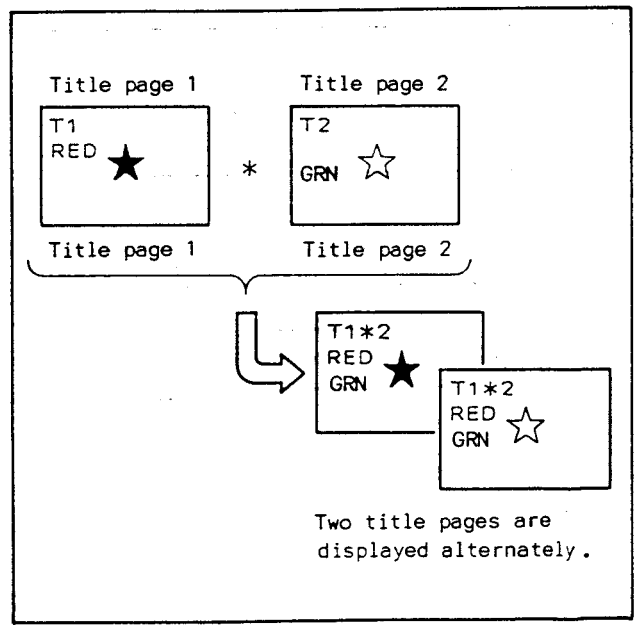


Fig. I-18

5) Title scrolling effect

With this function, a title can be scrolled up/down or left/right. In this camcorder, the scrolling effect can be made when the title display function is turned on or off. Any one of four directions (up, down, left, right) is selectable for scrolling. (The scrolling takes approx. five seconds.)

The scrolling effect is applicable to mixing of two title pages, animation-like display of two title pages, three-dimensional (shadowed) title, and see-through title.

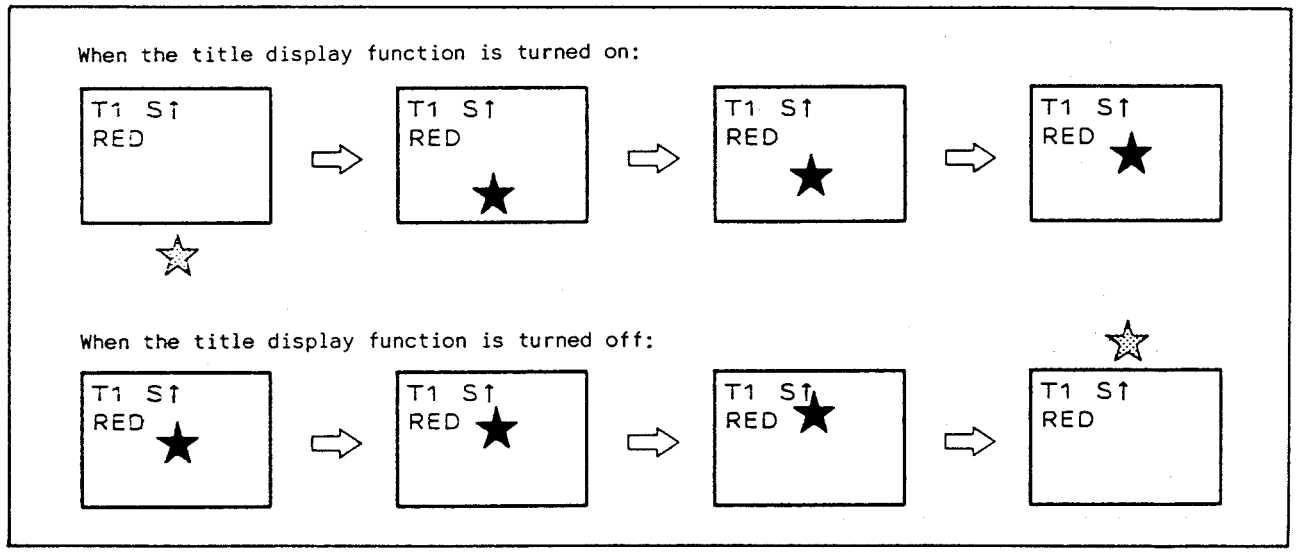


Fig. I-19

6) Title wiping effect

With this function, a title can be made to appear or disappear gradually as it is wiped. In this camcorder, the wiping effect can be given when the title display function is turned on or off. Any one of four directions (up, down, left, right) is selectable for wiping. (The wiping takes approx. five seconds.)

The wiping effect is applicable to mixing of two title pages, animation-like display of two title pages, three-dimensional (shadowed) title, and see-through title.

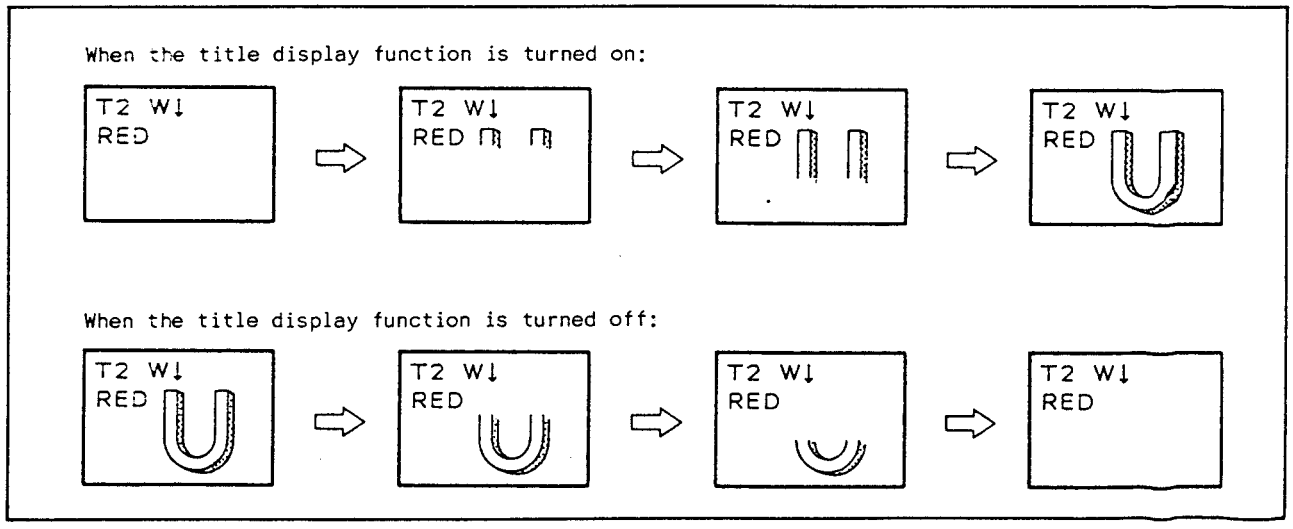


Fig. I-20

2-2-4 White-extraction auto white balancing in 25-area split screen evaluation (Newly developed)

The auto white balance function of this camcorder is designed based on the white-extraction AWB principle employed in the conventional model (e.g. A9). To attain higher accuracy in white balance adjustment control, the white-extraction weighting is carried out more precisely and the white-extraction range is variable with a change in luminance.

1) Weighting

In the conventional white-extraction AWB method, a white-extraction weighted value in each area was assigned '0' or '1' digitally. For improvement in accuracy, the newly developed white-extraction AWB function of this camcorder provides fine increments in a range of '0' and '1' (20 increments in weighting).

The conventional white-extraction AWB function recognized 'white' when the 25-area split color data was located in the white-extraction area and 'not white' when it was not located in the white-extraction area.

In this camcoder, a weighted value is increased as the white-extraction area becomes nearer. That is, the weighting varies gradually in a sequence of 'not white', 'rather white' and then 'white'. This fine adjustment capability makes it possible to achieve white balancing with higher accuracy.

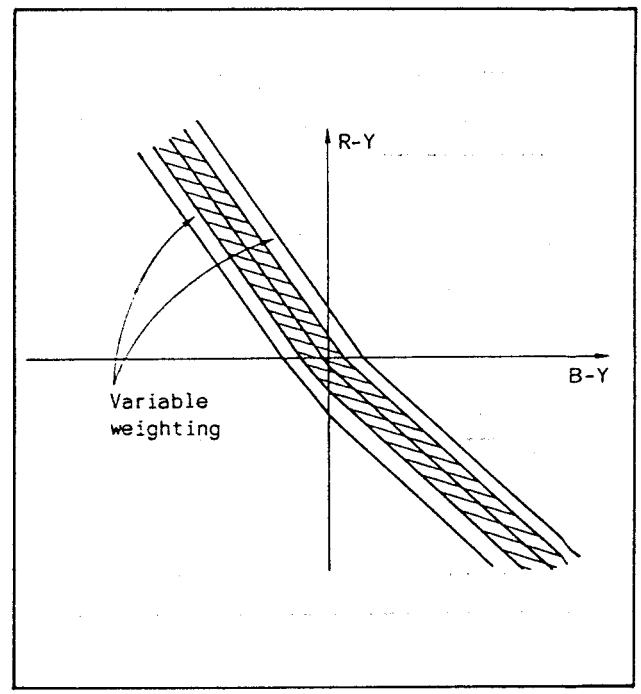


Fig. I-21

2) Variable white-extraction range

If the orientation of camcorder is changed quickly from outdoor scene to indoor scene, a pure white image is taken in but a creamy white image cannot be taken in since it is out of the white-extraction range. This may disable correct adjustment of white balance.

To cope with such a videographing situation, the new white-extraction AWB function is designed so that the white-extraction range can be widened for low luminance.

Also, after white balancing preadjustment, the white balance control speed is made faster if the aperture changes by ± 2 steps for more than a predetermined period of time. And, it is made slower if the aperture changes just slightly. This prevents sudden change in the tone of color.

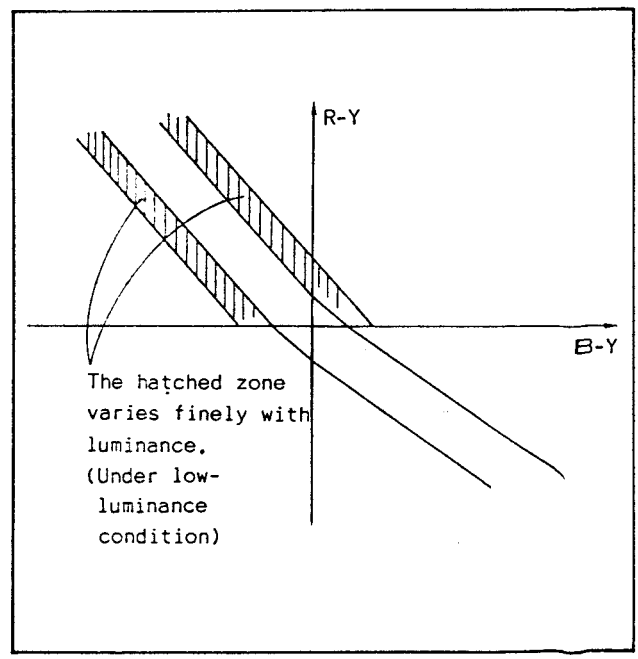


Fig. I-22

2-2-5 Auto iris level control

In the conventional model, the auto knee circuit was used to adjust the knee level/point when a scene with conspicuous illuminations (night outdoor scene) was videographed. However, for some scenes, the entire picture might become too dark.

To circumvent this in this camcorder, the iris level is controlled according to the high luminance level in subject without using the auto knee circuit. Thereby, this camcorder can minimize flaring and color washing-out to ensure the high quality of picture.

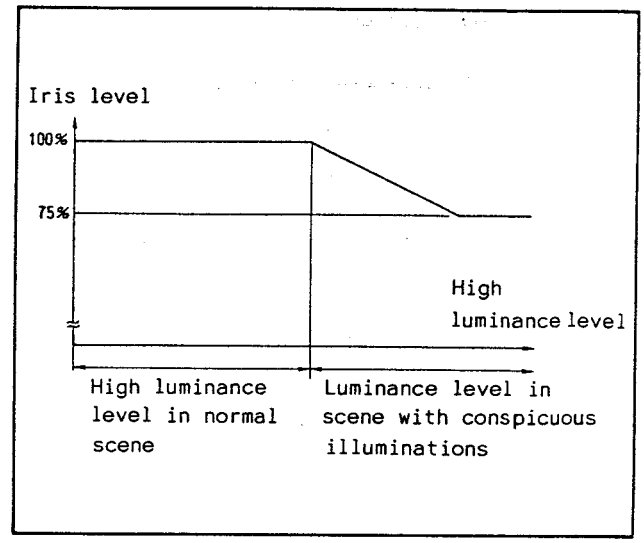


Fig. I-23

2-3 Recorder section

2-3-1 Small four-head mechanical chassis (UC)

The compact, lightweight small-diameter four-head mechanical chassis employed in this camcorder is an improved version of MC-5 mounted in Model A9. While inheriting high performance and superb reliability from the previous version, this mechanical chassis is smaller in size and lighter in weight. More specifically, the shape of cassette compartment has been improved and the number of component parts has been reduced to make the mechanical chassis 10 gr lighter than the conventional design. The weight of this mechanical chassis (165 gr) is lighter than any other designs at present (as of May '91). The operational sequences of this mechanical chassis are similar to those of MC-5.

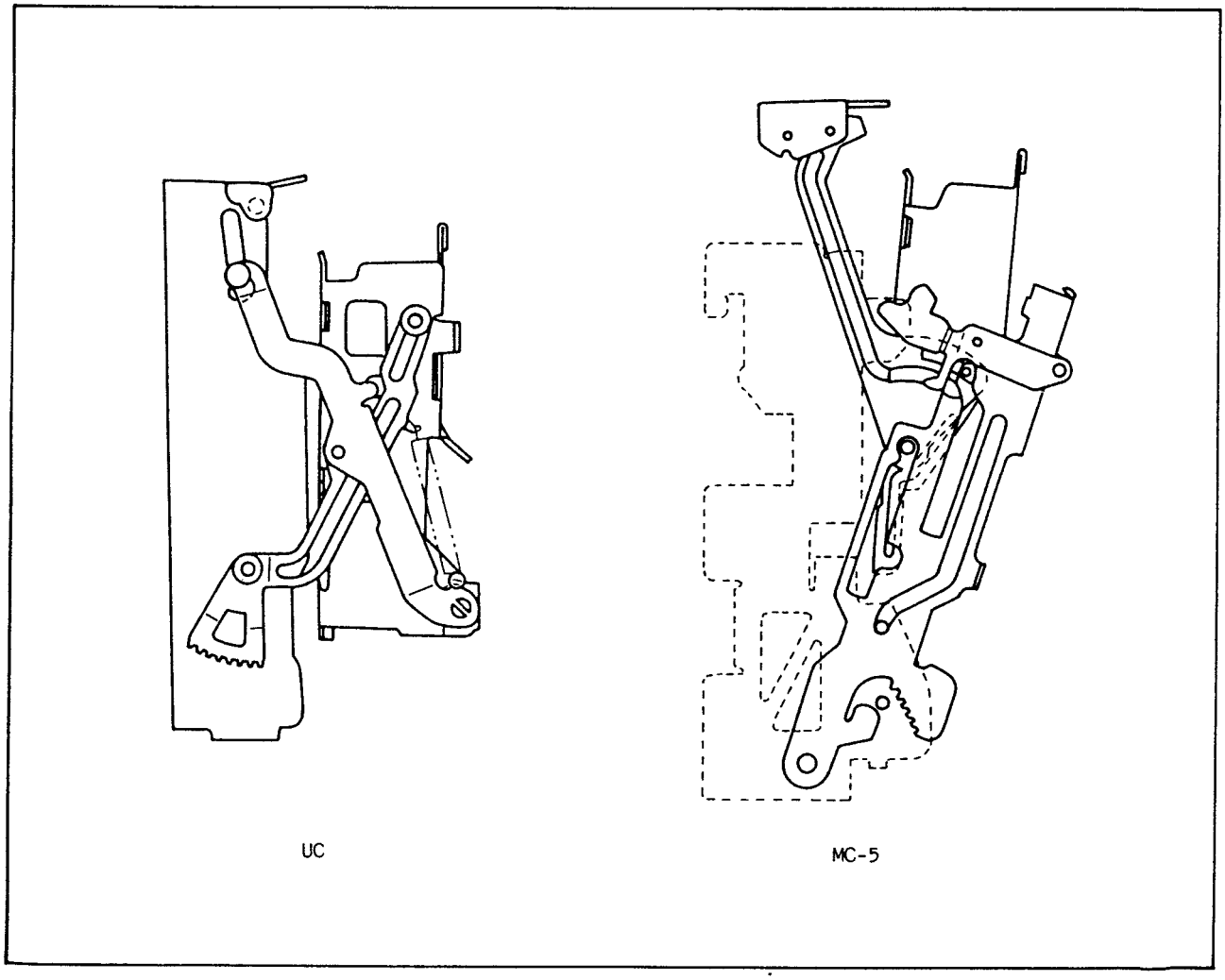


Fig. I-24

2-3-2 Newly developed ICs

1) Y/C REC IC (IC105)

Electric power is consumed even in the recording standby/pause state as well as in the recording-in-progress state. This means that the user must prepare the charged batteries for supplying power corresponding to two or three times the expected length of shooting period. In this camcorder, the new IC LD5089 developed by Canon is used for signal processing in the recorder section to reduce power consumption. This IC will contribute to decrease in the number of charged batteries to be prepared by the used.

Figure I-25 shows the functional block diagram of the signal processing circuit in this camcorder. The following circuit blocks are incorporated in the new IC:

(1) Y-signal emphasis circuit
(2) Y-FM modulator circuit
(3) C-signal emphasis circuit
(4) C-signal converter circuit
(5) Input changeover circuit
(6) Three-system character mixing circuit
(7) Video output drive circuit
(8) Y-signal AGC circuit
(9) Block control circuit (for controlling the above circuit blocks)

For these circuit blocks, serial data control is carried out. In this circuit configuration, some of adjustment points are eliminated and power required for each internal circuit block is turned on/off under serial data control. Thereby, power consumption is reduced substantially using the power manager function of microcomputer.

1. In the camera recording mode:
   IC105: Circuit blocks (1) to (6) and (9) are used.
   IC104: Power is turned off.

2. In the line recording mode (only in service mode):
   IC105: Circuit blocks (1), (2), (5), (6), (8) and (9) are used.
   IC104: Only the Y/C separation circuit and the chroma signal processing circuit are used.

3. In the playback mode:
   IC105: Circuit blocks (5), (6) and (9) are used.
   IC104: The Y/C playback circuit block is used.

In any mode, the circuit block (7) of IC105 is turned on/off according to whether the video pin jack is connected is not (turned on when it is connected). So, power consumption can be reduced unless the video pin jack is connected.

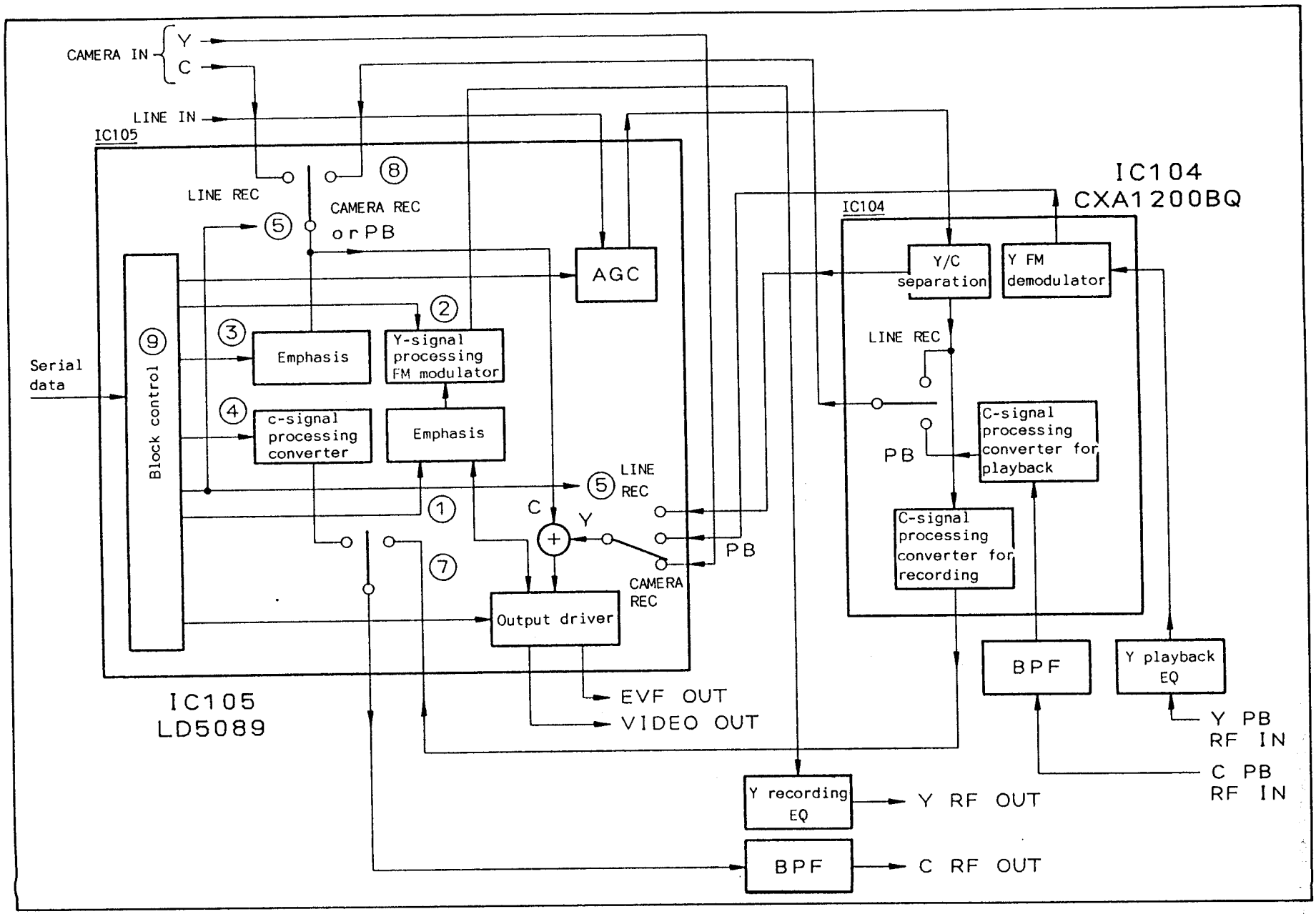

CAMERA IN
Y
C
LINE IN
IC105
LINE REC
CAMERA REC
or PB
AGC
Block control
Serial data
Emphasis
Y-signal processing FM modulator
c-signal processing converter
Emphasis
LINE REC
C
Y
PB
CAMERA REC
Output driver
EVF OUT
VIDEO OUT
IC105
LD5089
IC104
CXA1200BQ
IC104
Y/C separation
Y FM demodulator
LINE REC
PB
C-signal processing converter for playback
C-signal processing converter for recording
BPF
Y playback EQ
Y PB RF IN
C PB RF IN
Y recording EQ
Y RF OUT
BPF
C RF OUT

Fig. I-25

2) Regulator/control IC (IC701)

The switching regulator IC (IC701) is employed to allow using the size-AA alkaline dry batteries as well as the rechargeable Ni-Cd battery packs. Also, the power sources for recorder, camera, EVF and motor circuits are incorporated on the POWER SUPPLY P.C.B.

As shown in Fig. I-26, the switching regulator IC turns on/off its switch element (semiconductor device switch) while controlling the ratio of on/off repetition to provide stable power output. Having an advantageous characteristic that power consumption is reduced as the input voltage becomes higher, this IC is well suitable for battery-driven circuits.

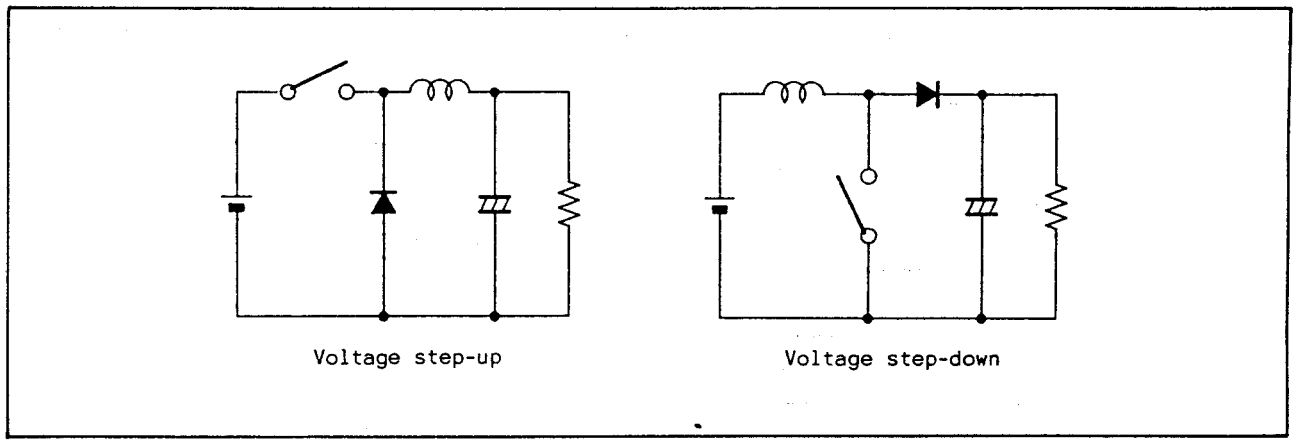


Fig. I-26

For permitting use of the size-AA alkaline batteries, the motor control circuit has been improved also. In the conventional motor control circuit, the input voltage was directly applied to drive the motor. In the improved motor control circuit, the feedback loop function for input voltage is provided to ensure stable drive of the motor in a wider input voltage range.

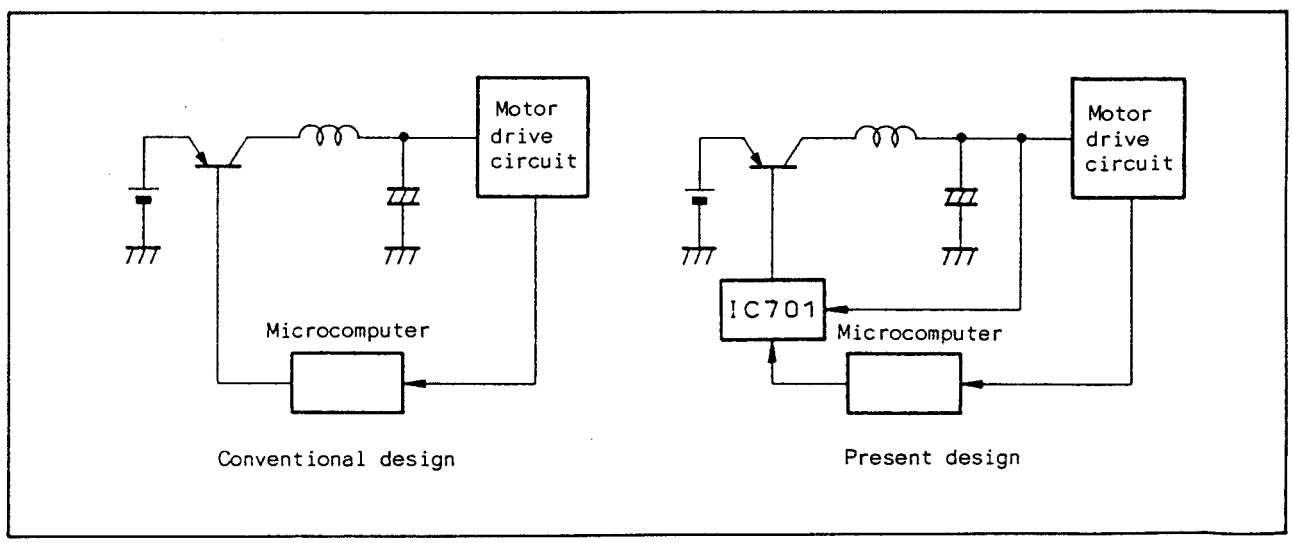


Fig. I-27

2-3-3 Automatic wind-swept noise reduction

This function automatically detects blowing of wind and alters the low frequency band of microphone amplifier to prevent wind-swept noise from being recorded.

In a common videographing situation, sound to be recorded is widely spread around a frequency level of approx. 1 kHz. The sound spectrum produced by wind blowing over the microphone is increased as its frequency band is lowered. Therefore, the low frequency level is compared with the intermediate frequency level, and if the magnitude of low frequency component is larger to a predetermined extent, it is judged that the microphone is blown with wind. In the circuit operation, the intermediate frequency level is subtracted from the low frequency level. According to the resultant signal, the variable filter is adjusted to reduce wind-swept noise.

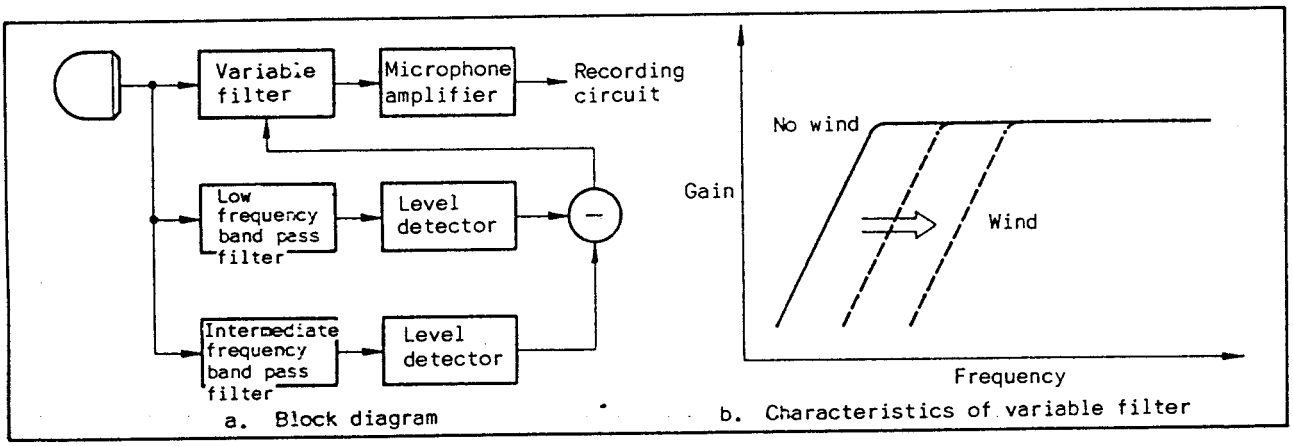


Fig. I-28

2-3-4 Rechargeable secondary lithium battery

In lieu of the conventional primary lithium battery, the rechargeable secondary lithium battery is incorporated in this camcorder. This rechargeable lithium battery has a capacity of approx. 20 mAH, and it is automatically recharged when the battery pack (approx. 5 V or higher) is mounted on the camcorder or other power supply is connected (regardless of whether the POWER switch is turned on or off). With full recharging (after the power supply is mounted for approx. one day), this lithium battery can run the auto date function for approx. 10 months (under room temperature condition in design theory). In practice, since the lithium battery works normally by recharging for approx. one hour per month at least, videographic data can be backed up dependably.

This camcorder is provided with the following backup functions:

(1) Resetting at power-off (keeping memory at power-on)

SHUTTER
GAIN UP
WB LOCK
DIGITAL MEMORY PAGE
SELF
SELF 30
FADE-T, Blanking of 'T'

(2) Backup with main power supply

DEW 1H TIMER

(3) Backup with rechargeable secondary lithium battery

FADE-T
R OFF
T OFF
TAPE COUNTER
DATE, TIME
DIGITAL MEMORY W/S
ERROR
SP/LP

(4) Backup with E^2PROM

VIDEO DATA
POWER-SAVE DATA
DESTINATION OF SHIPMENT (TV SYSTEMS)
DIGITAL MEMORY (COLOR, R, THROUGH, SHADOW)

3. Circuit Board Configuration

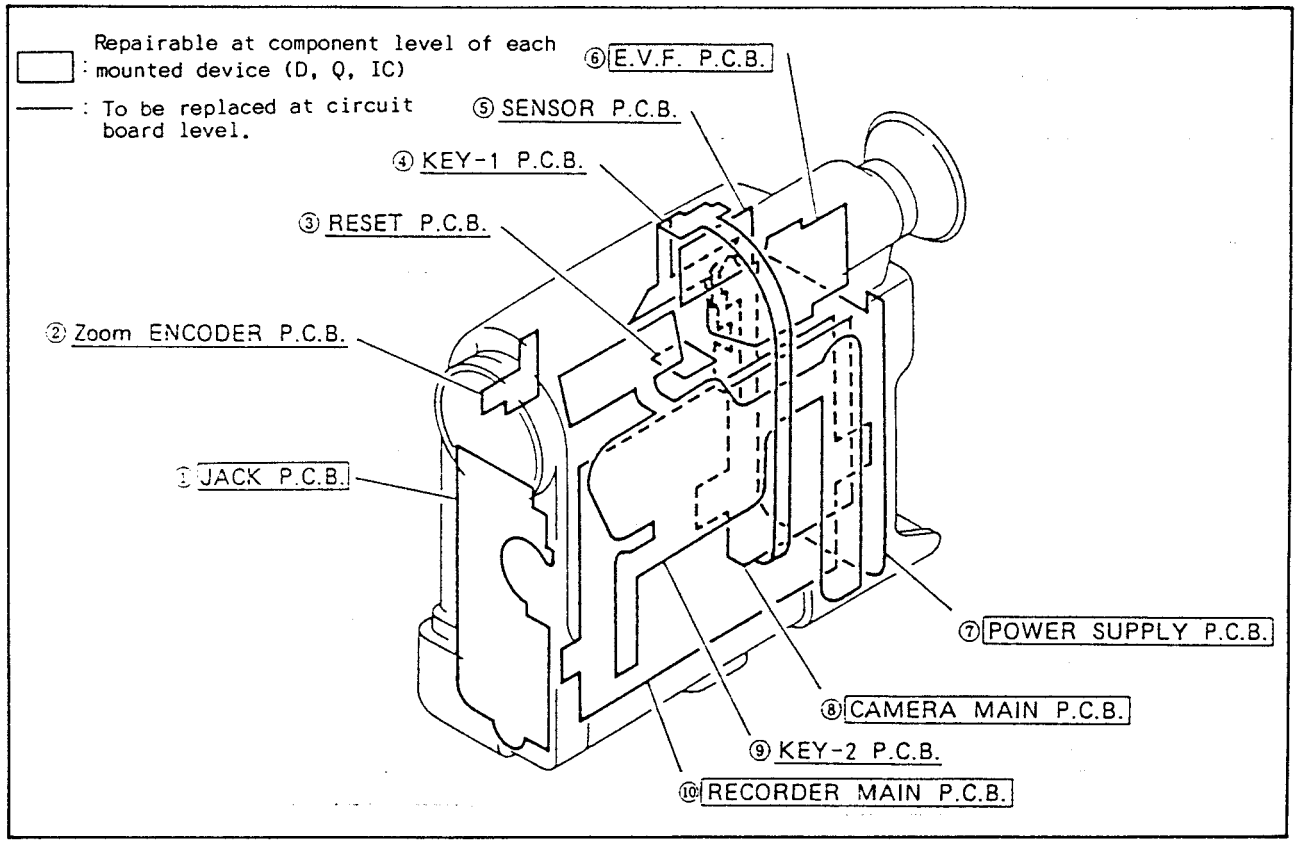


Fig. I-29

3-1 Features of circuit boards

① JACK P.C.B.
- Provided with the remote control IR receiving sensor and A/V terminals.

② ZOOM ENCODER P.C.B.
- Used for detecting the zoom position and transferring the zoom motor drive signal.

③ RESET P.C.B.
- Equipped with the focus reset switch.

④ KEY-1 P.C.B.
- The recorder key circuit is mounted on this circuit board.

⑤ SENSOR P.C.B.
- Drives the CCD image sensor, and processes the CCD signals to be delivered to the PROCESS circuit.

⑥ EVF P.C.B.
- Used to drive the electronic viewfinder.

⑦ POWER SUPPLY P.C.B.
- Used for supplying power from the battery terminal to each circuit. This circuit board is equipped with power fuses.

⑧ CAMERA-MAIN P.C.B.
- Processes the camera signals, and carries out AF driving.

⑨ KEY-2 P.C.B.
- The camera, recorder and digital memory key circuits are mounted on this circuit board.

⑩ RECORDER-MAIN P.C.B.
- Consists of the video signal processing (recording/playback) circuit, system control circuit, servo control circuit, and head amplifier.

4. Circuit Description

4-1 Lens section

4-1-1 Autofocus system

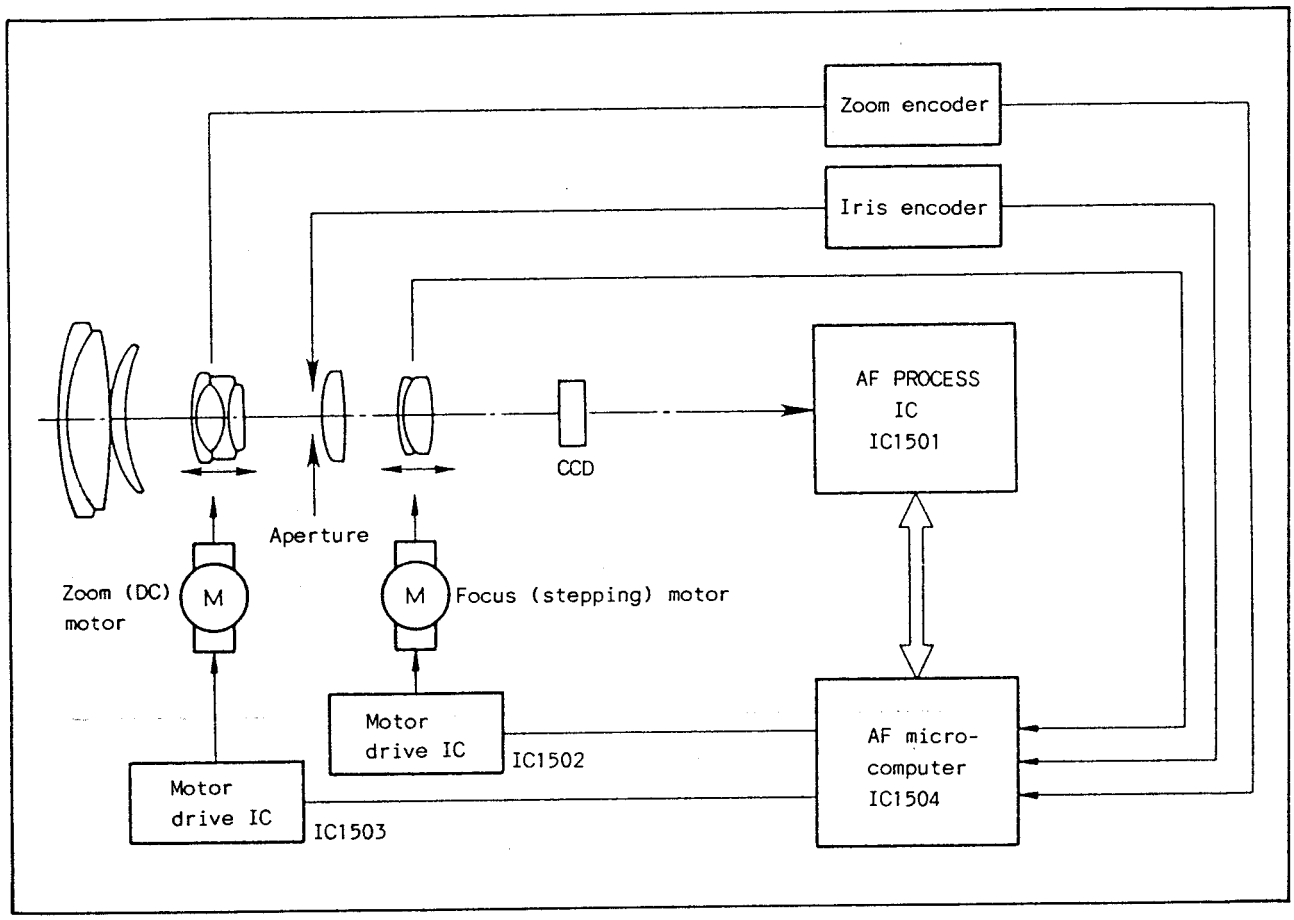


Fig. I-30

The inner-focus zoom lens is employed in the AF optical system of this camcorder. Under fuzzy-logic autofocus control, the focus lens is driven so that the high-frequency component of video signal will be maximized. Shown above is the AF system configuration in Model UC10.

For realizing reduction in size and weight (basic design concept of this camcorder), the following latest technologies are adopted:

(1) Inner-focus zoom lens in optical system
(2) Fuzzy inference for AF control

For fuzzy-logic autofocusing (based on that in Model E800/A10), the following control schemes are used to suppress defocusing at zooming in the inner-focus optical system. (In the inner-focus optical system, positional correction is required according to movement of the zoom lens since the focus lens serves also as the compensator of zoom lens.)

(1) Fuzzy-logic output for speed adjustment during zooming
(2) Higher accuracy in linear approximation of cam trajectory
(3) Focus lens drive speed control
(4) Correction of focus lens drive speed through measurement of zoom motor speed

(1) Fuzzy-logic output for speed adjustment during zooming

During zooming operation, the focus/zoom compensator lens must trace a cam trajectory accurately. That is, fine speed control is required according to movement of the zoom lens. For this purpose, the fuzzy-logic output (autofocus control function) is used to provide ±127 speed adjustment levels in this camcorder.

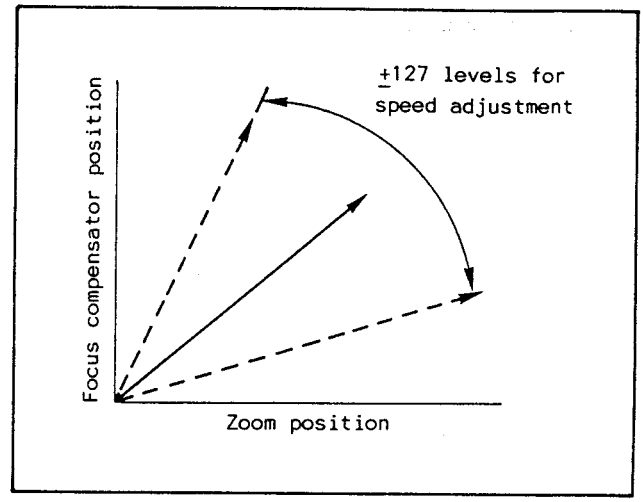


Fig. I-31

(2) Higher accuracy in linear approximation of cam trajectory

The zooming range from wide-angle end to telephoto end is divided into 32 increments, and the number of cam trajectories is increased for linear approximation. Thereby, a slope of cam trajectory can be attained as a speed value required for movement of the focus lens.

(3) Focus lens drive speed control

A slope of cam trajectory represents a speed value of focus lens movement. To let the focus lens trace a trajectory accurately. The cam trajectory map is divided into zones as shown in Fig. I-32. Using the zone-divided cam trajectory map data, the focus lens is driven to trace a proper cam trajectory under fuzzy-logic control.

In other words, changeover of cam trajectory is enabled by adjusting a drive speed of focus lens. In zooming from wide-angle position to telephoto position, the cam trajectory changeover is carried out through detection of image blurring.

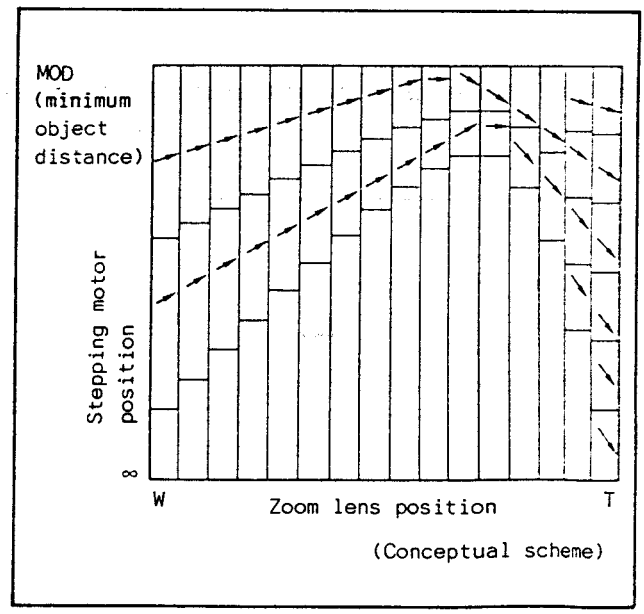


Fig. I-32

(4) Correction of focus lens drive speed through measurement of zoom motor speed

To minimize image blurring in zooming operation, the focus lens drive speed is regulated under control of the microcomputer. If the zoom motor speed varies due to deterioration, compensation must be made for speed variation. To cope with possible aging variation of zoom motor speed, the zoom motor is automatically run through three zones at power-on for measuring its speed. Thus, the focus lens drive speed is adjusted according to the measured data of zoom motor speed.

4-1-2 Autofocus circuit

The basic configuration of autofocus circuit is the same as that in Model E800/A10. A significant difference from the conventional arrangement is that the analog and digital circuits are integrated into a single microchip in this camcorder.

The following describes the autofocus circuit of this camcorder with particular emphasis placed on differences from the conventional circuit.

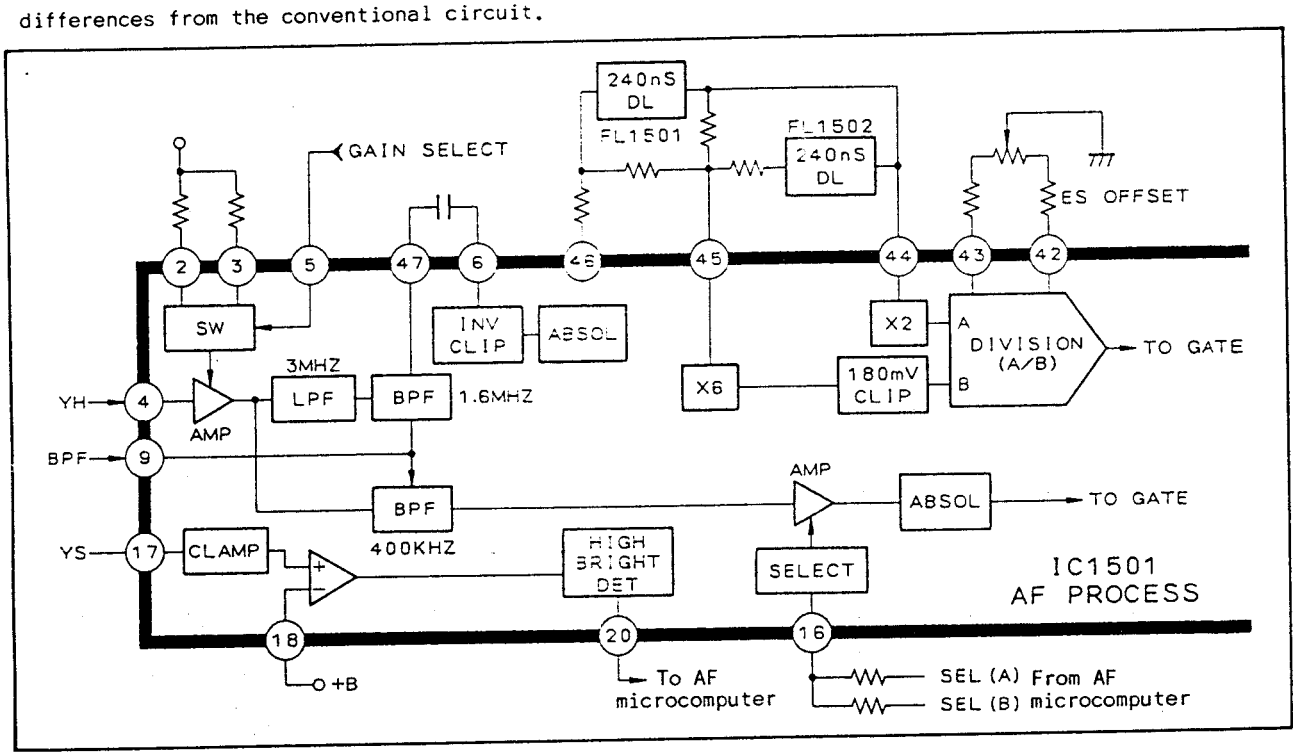


Fig. I-33

The YH signal is input to pin 4 of IC1501. Then, after passing through the amplifier, the Y signal (for ES signal) undergoes frequency band limitation by the 3 MHz low-pass filter and travels through the 1.6 MHz band-pass filter that is made active by the BPF changeover signal (DC value) from pin 9. After INV CLIP processing, the absolute value is output from pin 46 to the delay line circuits. The delayed signals are applied to pins 44 and 45. Then, after input level adjustment through the internal amplifiers, these signals are fed to the division circuit for detecting the condition of leading ege. As the lens is moved to the in-focus position, the output of division circuit nears '1'.

On the other route, after passing through the amplifier, the Y signal (for CU signal) undergoes frequency band limitation by the 400 kHz band-pass filter. Then, according to the SEL A and SEL B signals input from pin 16, it is amplified 7.5 times, 15 time or 29.5 times. (The gain of amplification is changed in increments of one volt.)

° On detection of high luminance

The YS signal is input to pin 17, fed through the clamp circuit and high luminance detector circuit, and delivered to the IC1504 (AF microcomputer) from pin 20. Upon receipt of this signal, the IC1504 returns the GAIN SELECT signal to pin 5 of IC1501 for changeover of amplification gain.

The ES filters, YS high luminance detector circuit, and digital circuit are integrated into this IC1501. (In the conventional arrangement, these circuits are contained in separate ICs.)
The functional features are identical to those in the conventional design.

Also, two AF pulse motor driver circuits in the conventional design are integrated into a single IC.

4-1-3 Pin functions of AF microcomputer (IC1504)

Table I-4 (1/2)

Pin No.	Signal designation	I/O	Function
1	SERVICE MODE	I	Goes 'High' in service adjustment.
2 3 4	NC	-	Open.
5 6	SEL B SEL A	O	Used for selecting gain of BPF in the CU signal input circuit. The 'High' pulse is output per three vertical scan cycles. BPF / Signal: 7.5 times: SEL A = 0, SEL B = 0; 15 times: SEL A = 0, SEL B = 1; 29.5 times: SEL A = 1, SEL B = 0 * The phases of SEL A and SEL B ae different.
7	ZM WIDE Ⓗ	O	Wide-angle drive signal for the PZ motor.
8	ZM TELE Ⓗ	O	Telephoto drive signal for the PZ motor.
9 10 11 12	PM4 PM3 PM2 PM1	O	Pulse motor (focus motor) drive output.
13	ZOOM POSITION	I	Zoom position detection signal input.
14	FACE	I	Face color discrimination signal.
15	IRIS POSITION	I	Iris position detection signal input from Hall element. Open: 2.8 V Close: 0.8 V
16	GND	-	Connected with ground.
17	ES	I	ES value input.
18	RESET SW Ⓛ	I	Focus reset switch signal input.
19	CU	I	CU value input.
20	HIGH BRIGHT HOLD	I	High luminance detection signal input. On detection of high luminance, this signal goes 'High' to cause 'High' level at pin 37.
21	AD VREF Ⓛ	I	Connected with ground.
22	AD VREF Ⓗ	I	3.6 V reference voltage input.
23 24	GND	-	Connected with ground.
25	-	I	Goes 'High' in the microcomputer operation mode.
26	NC	-	Open.
27 28	GND GND	-	Connected with ground.
29 30	NC NC	-	Open.
31	X OUT	O	Connected with the 12 MHz crystal oscillator.
32	NC	-	Open.
33	X IN	I	Connected with 12 MHz crystal oscillator.
34	TELE SW Ⓗ	I	TELE switch input. Goes 'High' when the switch is pressed.
35	NC	-	Open.
36	WIDE SW Ⓗ	I	WIDE switch input. Goes 'High' when the switch is pressed.
37	GAIN SELECT	O	Gain changeover control signal for Y signal input amplifier.
38	NEAR SW Ⓛ	I	NEAR switch input for driving the motor in the MOD direction when the manual focus mode is selected. Goes 'Low' when the switch is pressed.

Table I-4 (2/2)

Pin No.	Signal designation	I/O	Function
39	FAR SW Ⓛ	I	FAR switch input for driving the motor in the infinity direction when the manual focus mode is selected. Goes 'Low' when the switch is pressed.
40	AF SW Ⓛ	I	Autofocus/manual select switch input. Goes 'Low' when the switch is pressed.
41	P. ON BLK	O	White face output signal at power-on.
42	FOCUS FRAME SW	O	Goes 'High' when displaying the foucs frame on the viewfinder screen.
43	RESET Ⓛ	I	Reset input. Goes 'L' at resetting.
44	NC	-	Open.
45	SIRQ	I	Interrupt signal input for adjustment at the factory.
46	VD. INV.	I	Vertical sync signal input.
47	-	I	Unused.
48	NC	-	Open.
49	GND	-	Connected with ground.
50	RESET SENS. LED	O	Focus reset switch on/off output.
51	AF DATA IN	I	Used for serial communication in adjustment at the factory.
52	AF DATA OUT	O	
53	AF CLOCK	O	
54	AF-CS	I	
55	CAMERA 5V	I	Connected with CAMERA 5V.
56	AF-STB	O	Strobe signal output for character generation.
57	PMM4	O	Pulse motor (focus motor) drive output.
58	PMM3		
59	PMM2		
60	NC	-	Open.
61	NC	-	Open.
62	PMM1	O	Pulse motor (focus motor) dirve output.
63	GND	-	Connected with ground.
64	LENS CAP Ⓗ	I	Goes 'High' when the lens is covered with the cap.

4-2 Camera section

4-2-1 Power supply circuit

In this camcorder, power voltages required for the camera and recorder circuits are generated on the POWER SUPPLY P.C.B.

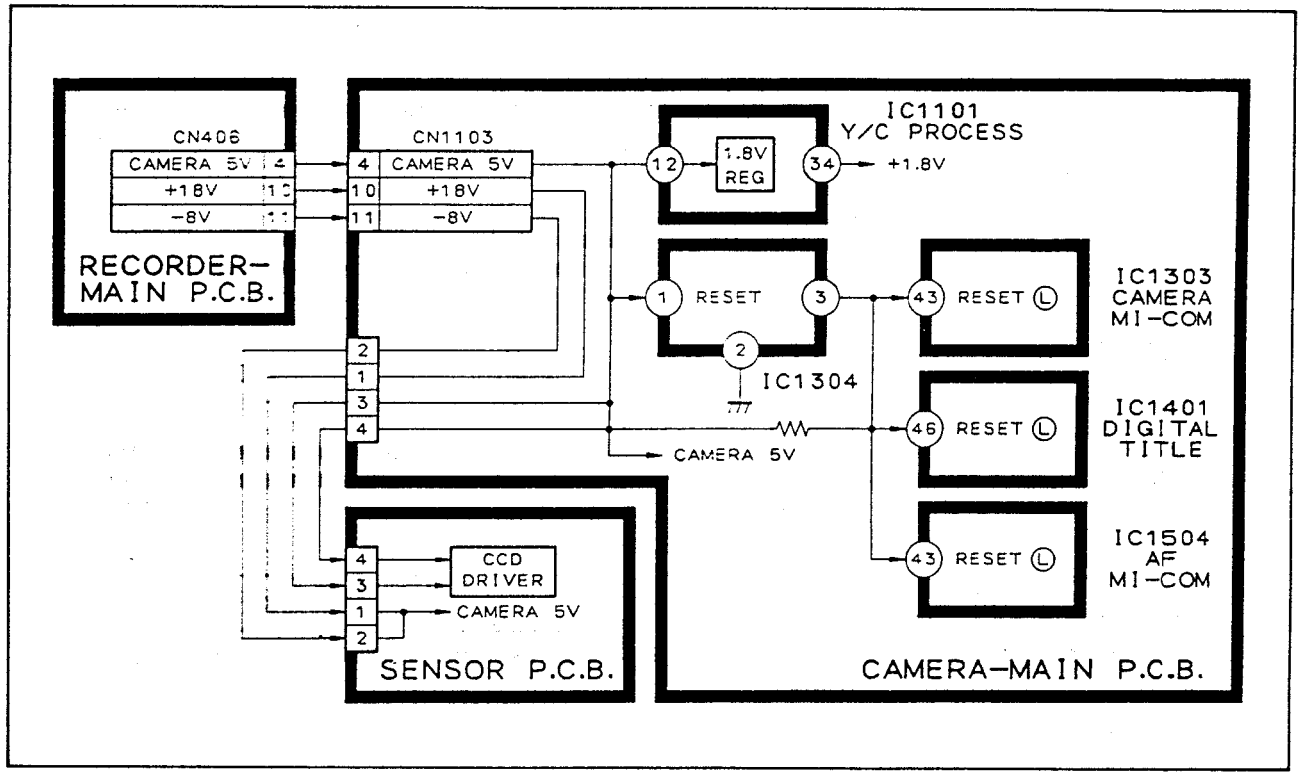


Fig. I-34

(1) Kinds of power sources:

Power voltages for the camera circuits are supplied from the RECORDER-MAIN P.C.B.

° CAMERA 5V (-18 V, -8 V)
CAMERA 5V is fed from the RECORDER-MAIN P.C.B.

° Reference voltage (+1.8 V)
Using CAMERA 5V, the IC1101 (Y/C PROCESS) generates +1.8 V power as the reference voltage for each circuit.

° Resetting of AF microcomputer in camera section
The AF microcomputer is reset when pin 3 of IC1304 goes 'Low' on the leading and trailing edges of CAMERA 5V.

4-2-2 Signal processing circuit

In the signal processing circuit of this camcorder, the Y/C PROCESS IC (IC1101) and SUB PROCESS I/C (IC1104) has the peripheral circuits that were separately mounted in the conventional arrangement. The circuit configuration is similar to the conventional design.

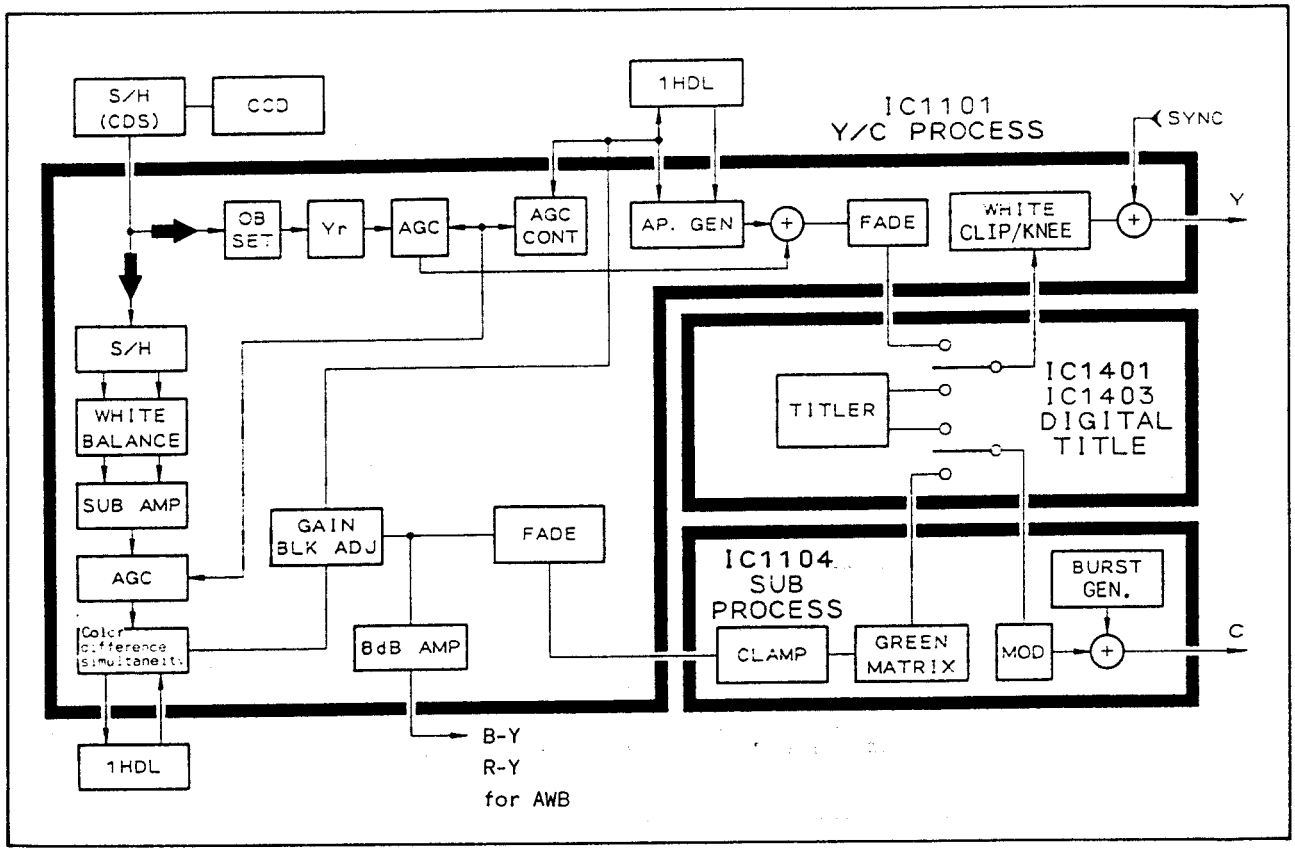


Fig. I-35

(1) Iris control circuit

The IRIS CONTROL signal Ys output from pin 58 of IC1101 is applied to the buffer and subjected to center-weighted average-metering processing. Then, it is input to pin 13 of IC1104. Also, the IRIS POSITION signal is input to the camera microcomputer to send data to the D/A converter, from which the IRIS ADJUST output is applied to pin 14 of IC1104. Receiving the Ys signal and IRIS ADJUST output, the driver circuit in IC1104 carries out iris control through pins 15 and 16.

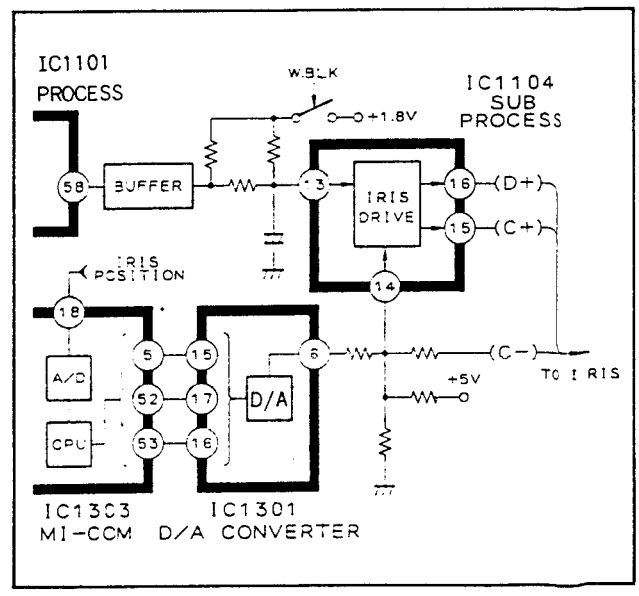


Fig. I-36

(2) Auto white balance circuit

The R-Y and B-Y color difference signals output from pins 24 and 28 of IC1101 are applied to pins 25 and 28 of IC1104. Also, the gate pulse and reset pulse signals output from the camera microcomputer are applied to pins 20 and 21 of IC1104. The R-Y and B-Y color difference signals input to IC1104 are gated/reset and then output from pins 27 and 30. These signals are send to pins 13 and 15 of the camera microcomputer.

In the camera microcomputer, computational operation is carried out using the data stored in E^2PROM. The computed data is sent to the D/A converter. According to the computed data, the IC1302 outputs the R-CONT and B-CONT signals from its pins 7 and 8 to pins 66 and 70 of IC1101. In this sequence, white balance gain is controlled.

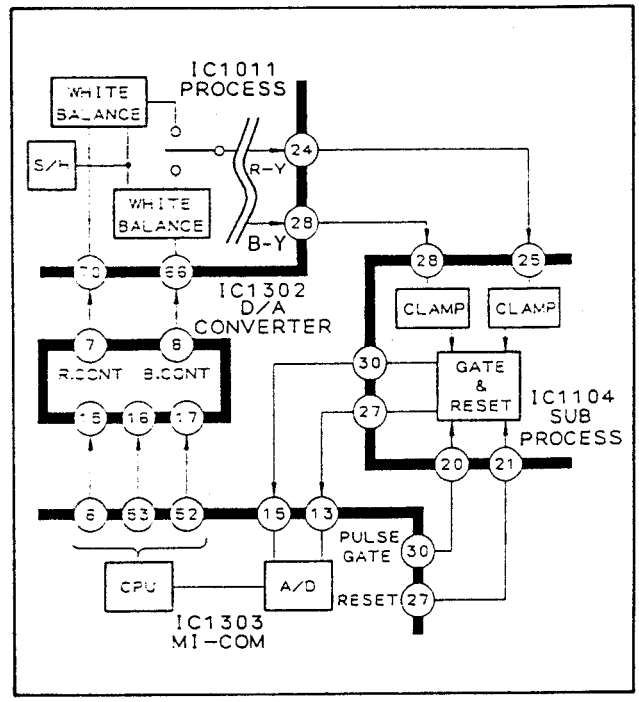


Fig. I-37

(3) Digital memory circuit

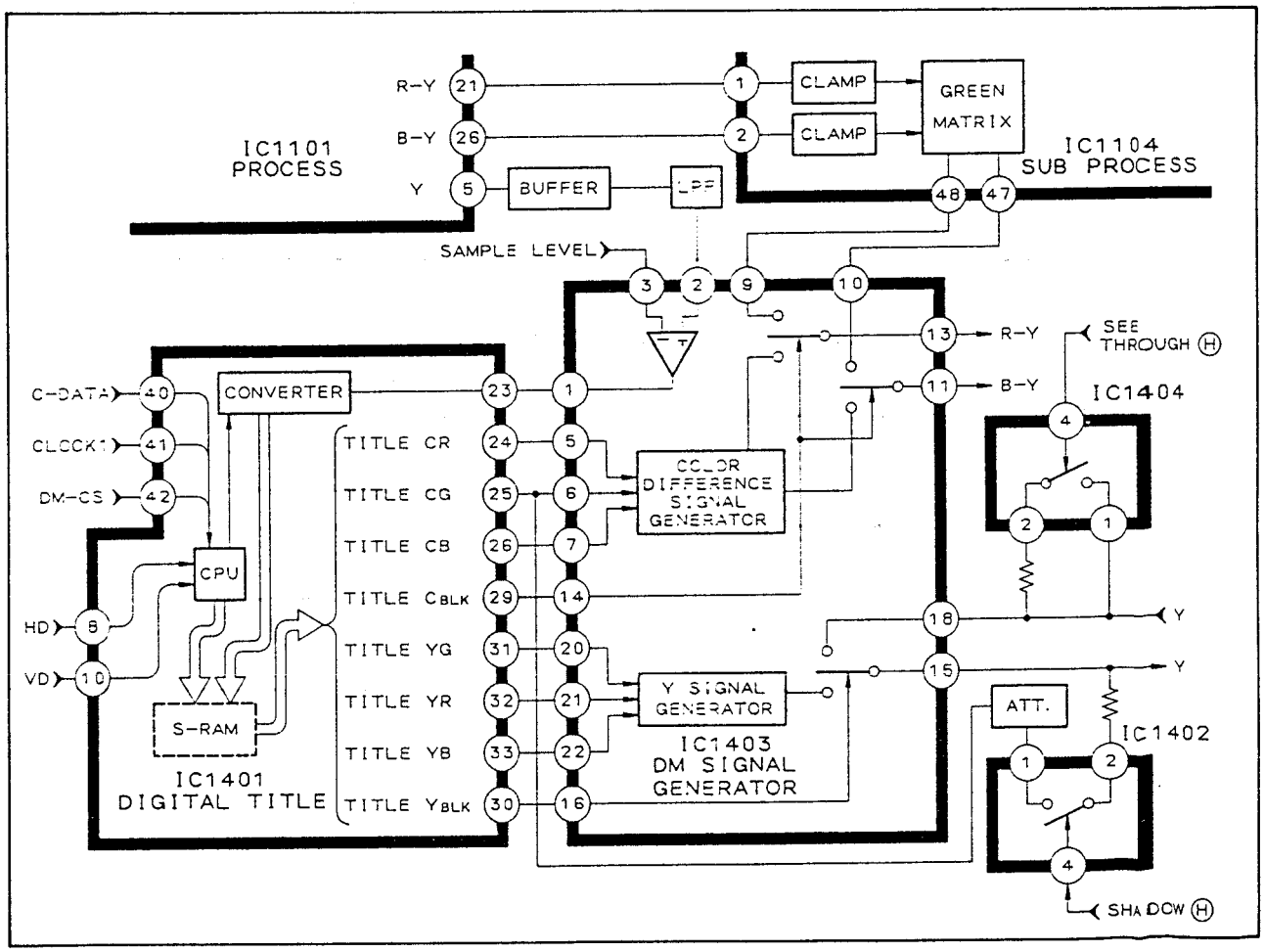


Fig. I-38

° In storing:

The Y signal output from pin 5 of IC1101 is applied to pin 2 of IC1403 through the buffer and low-pass filter. In IC1403, this signal is compared with the SAMPLE LEVEL signal applied to pin 3, and the resultant signal is output from pin 1 as a digitized signal. The SAMPLE LEVEL signal is furnished from the IC1302 (D/A converter). Its DC level is changeable through 16 steps. As in the conventional circuit design, the DC level varies within a range of 10% to 60%. The standard level of 35% is used for normal operation.

After digitization, the Y A/D signal is input to pin 23 of IC1401 and subjected to serial-to-parallel conversion in it. Then, this signal is stored into a specified location of the built-in S-RAM.

° In imposing:

The data stored in the S-RAM of IC1401 is red out in ascending order of addresses. The R, G and B digital memory color signals are output from pins 24, 25 and 26 of IC1401. Also, the R, G and B video components of luminance signal are output from pins 31, 32 and 33 of IC1401. These color signals are fed to IC1403 and then converted into the DM R-Y, DM B-Y and DM Y signals through the internal matrix circuit. Then, these signals are output after switching with the ordinary camera signal (using the Y BLK and C BLK signals output from pins 29 and 30 of IC1401). Also, in the see-through mode, the IC1404's switch turns on to mix the DM Y signal with the raw signal at a specified ratio.

The above operation control sequence is conducted through serial communication with the camers microcomputer (IC1303). Listed below are the data signals handled in this serial communication.

- ° Title memory on/off
- ° Title display on/off
- ° Reverse display on/off
- ° 1-page/2-page mode selection

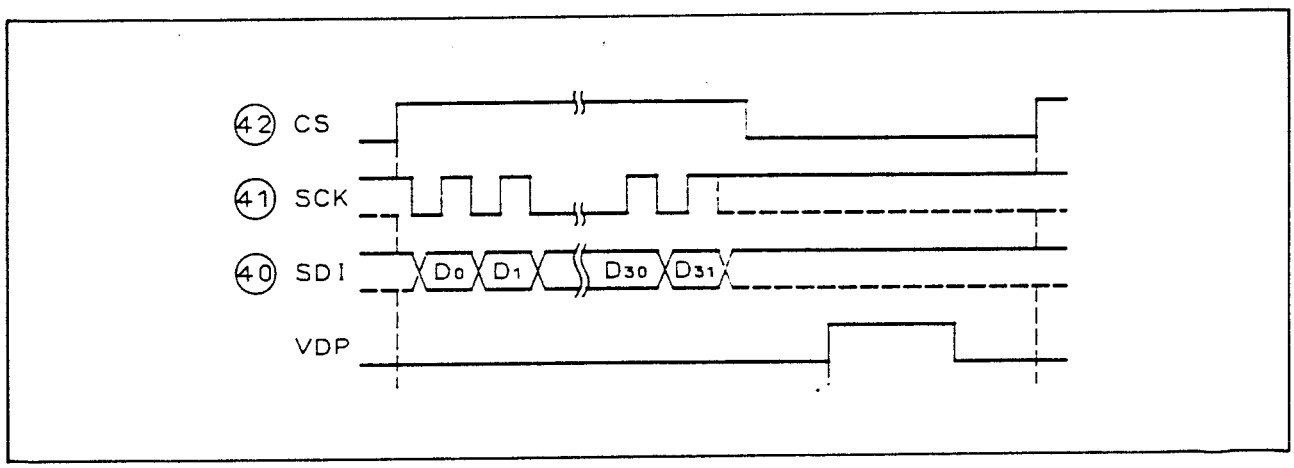


Fig. I-39

4-2-3 Pin functions of digital title IC (IC1401)

Table I-5

Pin No.	Signal designation	I/O	Function
1	TEST 0	I	Connected with ground.
2	Vss	-	Connected with gorund.
3	X OUT	O	Connected with LC oscillator.
4	X IN	I	Connected with the 10 MHz crystal oscillator.
5	V_{DD}	-	Connected with EVER 5V.
6	PD	O	PLL phase comparison output.
7	Vss	-	Connected with ground.
8	HD	I	Horizontal sync signal input.
9	TEST 1	I	Connected with ground.
10	VD	I	Vertical sync signal input.
11	NTSC Ⓗ/PAL Ⓛ	I	NTSC/PAL scheme selection.
12	XEX-CS	I	Connected with EVER 5V.
13	EXS-CLOCK	I	Connected with EVER 5V.
14	EXS-DATA	I	Connected with ground.
15	BUSY	O	Goes 'High' when wiping/scrolling is performed.
16	RESET	I	Reset signal input.
17	V_{DD}	-	Connected with EVER 5V.
18	CG IN	I	Connected with ground.
19 ~ 22	-	O	Unused. Open.
23	Y (DM OUT)	I	Digital memory video input.
24	TITLE CR	O	Title signal R output.
25	TITLE CG	O	Title signal G output.
26	TITLE CB	O	Title signal B output.
27	-	O	Unused. Open.
28	Vss	-	Connected with ground.
29	TITLE CBLK	O	Title display select signal (color signal).
30	TITLE YBLK	O	Title display select signal (luminance signal).
31	TITLE YG	O	Title luminance (G component) output.
32	TITLE YR	O	Title luminance (R component) output.
33	TITLE YB	O	Title luminance (B component) output.
34	SHADOW	O	Goes 'High' for shadowing.
35	-	O	unused. Open.
36	Y BLK K	I	Connected with ground.
37	SEE THROUGH	O	Goes 'High' when the see-through mode is selected.
38	-	O	Unused. Open.
39	V_{DD}	-	Connected with EVER 5V.
40	S-DATA	I	Data input for serial communication with the camera microcomputer (IC1303).
41	S-CLOCK	I	Clock input for serial communication with the camera microcomputer (IC1303).
42	DM-CS	I	Chip select signal for serial communication with the camera microcomputer (IC1303).
43	FIELD IN	I	Field discrimination signal input.
44	FIELD OUT	O	Field discrimination signal output.

4-2-4 Pin functions of digital memory signal generator IC (IC1403)

Table I-6

Pin No.	Signal designation	I/O	Function
1	Y (DM IN)	O	Digital memory video output.
2	Y IN	I	Camera luminance signal input.
3	SAMPLE LEVEL	I	Threshold level signal for digital memory read-in.
4	TH CONT.	I	Connected with CAMERA 5V.
5	TITLE CR	I	Title signal R input.
6	TITLE CG	I	Title signal G input.
7	TITLE CB	I	Title signal B input.
8	GND	-	Connected with ground.
9	R-Y IN	I	R-Y signal input.
10	B-Y IN	I	B-Y signal input.
11	B-Y (DM OUT)	O	'B-Y + title' signal output.
12	CLP	I	Chroma blanking input.
13	R-Y (DM OUT)	O	'R-Y + title' signal output
14	TITLE CBLK	I	Chroma blanking input.
15	Y (DM OUT)	O	'Camera luminance + title' signal output.
16	TITLE YBLK	I	Luminance blanking input.
17	Y CLP	-	Connected with the DC clamp capacitor.
18	Y IN	I	Camera luminance signal input.
19	Vcc	-	Connected with CAMERA 5V.
20	TITLE YG	I	Title luminance (G component) input.
21	TITLE YR	I	Title luminance (R component) input.
22	TITLE YB	I	Title luminance (B component) input.
23	TITLE Y GC	I	Used for gain adjustment of title luminance signal.
24	TITLE C GC	I	Used for gain adjustment of title chroma singal.

4-2-5 Pin functions of D/A converter (IC1301)

Table I-7 (1/2)

Pin No.	Signal designation	I/O	Function
1	Vss	I	Connected with ground.
2	CHROMA 1H ADJ	O	Chroma 1H delay gain adjustment.
3	O.B	O	OB setup adjustment.
4	AGC MAX CONT.	O	AGC maximum gain adjustment. Normal: 2.3 V, Gain up: 1.6 V
5	OFFSET	O	Color difference simultaneity adjustment.
6	IRIS	O	Auto iris adjustment.
7	AGC	O	Y AGC adjustment.
8	FH/2	O	FH/2 color difference error adjustment.
9	BURST GAIN	O	Burst gain adjustment.
10	V_{DD}	I	Connected with CAMERA 5V.
11	Vcc	I	Connected with CAMERA 5V.
12	BL R	O	Carrier balance R adjustment.
13	BL B	O	Carrier balance B adjustment.
14	NC	-	Open.
15	LDP1	I	Input load pulse 1
16	C-CLOCK	I	Clock input from the camera microcomputer.

Table I-7 (2/2)

Pin No.	Signal designation	I/O	Function
17	C-DATA	I	Data input from the camera microcomputer.
18	B GAIN	O	B-Y gain adjustment.
19	R GAIN	O	R-Y gain adjustment.
20	GND	I	Connected with ground.

4-2-6 Pin functions of D/A converter 2 (IC1302)

Table I-8

Pin No.	Signal designation	I/O	Function
1	Vss	I	Connected with ground.
2	SAMPLE LEVEL	O	Threshold level signal for digital memory read-in.
3	V-FADE	O	Video face control signal output.
4	KNEE	O	Knee control output.
5	W. CLIP	O	White clip adjustment.
6	CCD RESET	O	CCD reset adjustment.
7	R CONT.	O	White balance control signal output (R).
8	B CONT.	O	White balance control signal output (B).
9	A-FADE	O	Audio fade control signal output.
10	V_{DD}	I	Connected with CAMERA 5V.
11	Vcc	I	Connected with CAMERA 5V.
12	IRIS ENC. 2	O	Iris encoder control output.
13	BURST PHASE	O	Burst phase adjustment.
14	NC	-	Open.
15	LDP2	I	Input load pulse 2.
16	C-CLOCK	I	Clock input from the camera microcomputer.
17	C-DATA	I	Data input from the camera microcomputer.
18	IRIS ENC. 1	O	Iris encoder control output.
19	BPF	O	ES/CU band-pass filter control output.
20	GND	I	Connected with ground.

4-2-7 Pin functions of camera microcomputer (IC1303)

Table I-9 (1/2)

<table>
<tr><th>Pin No.</th><th>Signal designation</th><th>I/O</th><th>Function</th></tr>
<tr><td>1</td><td>CP2</td><td>I</td><td>Pulse generation sync signal input.</td></tr>
<tr><td>2
~
4</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>5</td><td>LDP2</td><td rowspan="2">O</td><td rowspan="2">Load pulse signal output for serial data communication with the D/A converter (IC1301, IC1302).
When this signal goes 'High', the D/A converter operates according to each 12-bit data that has been input.</td></tr>
<tr><td>6</td><td>LDP1</td></tr>
<tr><td>7</td><td>E^{2}PROM. ON Ⓗ</td><td>O</td><td>Indicates that data is being written into E^{2}PROM.</td></tr>
<tr><td>8</td><td>GATE PULSE</td><td>O</td><td>Gate pulse for multi-pattern metering in 25-area split screen evaluation.</td></tr>
<tr><td>9</td><td>SHUTTER 4</td><td rowspan="4"></td><td rowspan="4">Shutter speed selection output.
In normal recording at a shutter speed of 1/50 sec., all of these signals become 'Low'.
<table>
<tr><th></th><th>1/60</th><th>1/125</th><th>1/250</th><th>1/500</th><th>1/1000</th><th>1/2000</th><th>1/4000</th><th>1/10000</th></tr>
<tr><td>SHUTTER 4</td><td>H</td><td>L</td><td>L</td><td>L</td><td>L</td><td>L</td><td>L</td><td>L</td></tr>
<tr><td>SHUTTER 3</td><td>L</td><td>L</td><td>L</td><td>L</td><td>H</td><td>H</td><td>H</td><td>H</td></tr>
<tr><td>SHUTTER 2</td><td>L</td><td>L</td><td>H</td><td>H</td><td>L</td><td>L</td><td>H</td><td>H</td></tr>
<tr><td>SHUTTER 1</td><td>L</td><td>H</td><td>L</td><td>H</td><td>L</td><td>H</td><td>L</td><td>H</td></tr>
</table></td></tr>
<tr><td>10</td><td>SHUTTER 3</td></tr>
<tr><td>11</td><td>SHUTTER 2</td></tr>
<tr><td>12</td><td>SHUTTER 1</td></tr>
<tr><td>13</td><td>R-Y</td><td>I</td><td>R-Y signal input for auto white balance.</td></tr>
<tr><td>14</td><td>Y IRIS</td><td>I</td><td>Y IRIS input for backlight compensation.</td></tr>
<tr><td>15</td><td>B-Y</td><td>I</td><td>B-Y signal input for auto white balance.</td></tr>
<tr><td>16</td><td>V REF.</td><td>I</td><td>Reference voltage input (1.8 V).</td></tr>
<tr><td>17</td><td>Y AGC</td><td>I</td><td>Y AGC signal input for auto knee contorl.</td></tr>
<tr><td>18</td><td>IRIS POSITION</td><td>I</td><td>IRIS encoder signal input.</td></tr>
<tr><td>19</td><td>AGC. V</td><td>I</td><td>Automatic gain control signal input.</td></tr>
<tr><td>20</td><td>GND</td><td>I</td><td>Connected with ground.</td></tr>
<tr><td>21</td><td>A/D REF Ⓛ</td><td>I</td><td>Lower-limit voltage input for A/D conversion (ground).</td></tr>
<tr><td>22</td><td>A/D REF Ⓗ</td><td>I</td><td>Upper-limit voltage input for A/D conversion (+3.6 V).</td></tr>
<tr><td>23
24</td><td>Vss</td><td>I</td><td>Connected with ground.</td></tr>
<tr><td>25</td><td>MODE B</td><td>I</td><td>Used for setting the microcomputer operation mode.
This signal is always 'High'.</td></tr>
<tr><td>26</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>27</td><td>MODE A</td><td>I</td><td>Used for setting the microcomputer operation mode.
This signal is always 'Low'.</td></tr>
<tr><td>28</td><td>CAMERA CS</td><td>I</td><td>Chip select signal for serial data communication with the main microcomputer (IC406).
Data communication is carried out while this signal remains 'Low'.</td></tr>
<tr><td>29
30</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>31</td><td>X OUT</td><td>O</td><td>Connected with the 12 MHz crystal oscillator.</td></tr>
<tr><td>32</td><td>NC</td><td>-</td><td>Open.</td></tr>
<tr><td>33</td><td>X IN</td><td>I</td><td>Connected with the 12 MHz crystal oscillator.</td></tr>
<tr><td>34</td><td>FCH MODE</td><td>I</td><td>Used for setting the function check mode for adjustment at the factory.
This signal is always 'High'.</td></tr>
<tr><td>35
36</td><td>NC</td><td>-</td><td>Open.</td></tr>
</table>

Table I-9 (2/2)

Pin No.	Signal designation	I/O	Function
37	ADJ MODE	I	The camera service mode is set up when this signal goes 'High'. Normal: Open.
38	DM-CS	O	Chip select signal for serial data communication with the digital title IC (IC1401). Data communication is carried out while this signal remains 'High'.
39	BUSY	I	Goes 'High' for wiping/scrolling of digital title.
40	P. ON BLK	I	White-face masking request signal input at power-on. White fading is performed while this signal remains 'High'.
41	L. CAP	O	Goes 'High' to indicate the lens cap state.
42	FACE	O	Goes 'High' upon detection of skin color at the center of viewfinder screen.
43	RESET Ⓛ	I	Microcomputer reset signal input.
44	NC	-	Open.
45 46	-	I	For external interruption. Unused. Always 'High'.
47	CAMERA REQ	O	Request signal for communication with the camera microcomputer. Goes 'Low' to indicate a communication request.
48	NC	-	Open.
49	Vss	I	Connected with ground.
50	-	I	Used for communication scheme selection. Always 'High'.
51	C-DATA	O	Main microcomputer data ouptut.
52	C-DATA	I/O	Main microcomputer data input, and D/A converter data output.
53	CLOCK 1	I/O	Clock input/output for serial data communciation.
54	CLOCK 1 OUT Ⓗ	I	Used for input/output selection of CLOCK 1 at pin 53. This signal goes 'Low' for input and 'High' for output.
55	V_{DD}	I	Connected with CAMERA 5V.
56	NC	-	Unused. Always 'High'.
57 〜 61	NC	-	Open.
62	RESET Ⓗ	O	Goes 'High' to reset the AWB/AE interface cicuit.
63	CAMERA 5V	I	Connected with CAMERA 5V.
64	VD	I	Pulse generation sync signal input.

4-2-8 Camera microcomputer peripheral circuit

In this camcorder, serial data from the microcomputer is subjected to D/A conversion to produce control voltages (in the same manner as in Model A9). The E^2PROM built in the microcomputer (IC1303) is used to store adjustment data in lieu of the conventional VR circuit. Also, communication with the digital title IC (IC1401) is carried out.

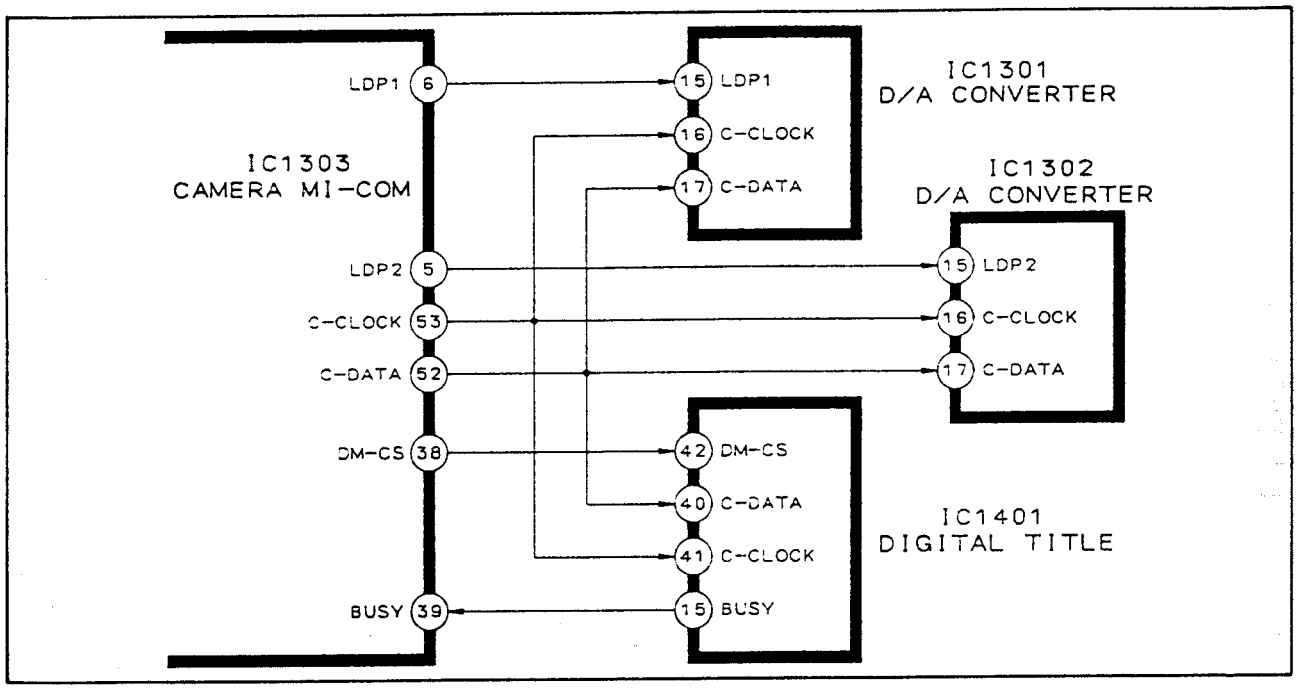


Fig. I-40

(1) Data transfer from microcomputer to D/A converter (IC1301, IC1302)

Unidirectional data communication from the microcomputer to the D/A converter is carried out per vertical scan period. Data transfer to IC1301 is performed only when power is turned on and when the PLAY mode is changed over to the CAMERA mode. Since the output port of IC1301 is functionally equivalent to the conventional VR circuit, invariable data is used for operation. Data transfer to IC1302 is performed when any data is altered.

Note that data is not loaded into the D/A converter unless the 'High' LDP pulse is applied.

(2) Data transfer from microcomputer to digital title IC (IC1401)

Unidirectional data communication from the microcomputer to the digital title IC is carried out per two vertical scan periods. The digital title chip select pulse is output from pin 38 of IC1303, and data is transferred while this pulse signal is 'High'.

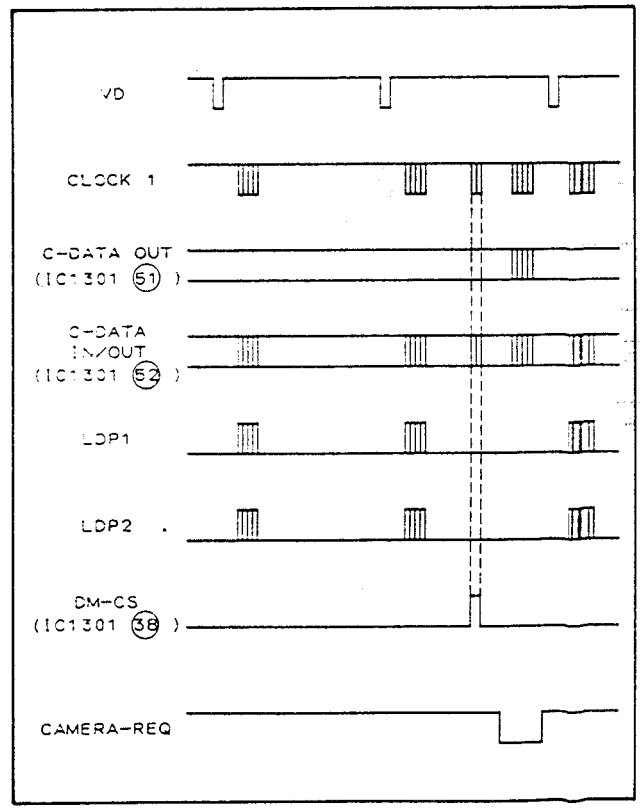


Fig. I-41

4-3 Recorder section

4-3-1 System control circuit

System control operations are carried out under control of the main microcomputer (IC406). The main microcomputer reads in key signals, determines an operation mode, and controls the recorder mechanisms and video signal circuits.

The E^2PROM built in the camera microcomputer (IC1303) is used to store system parameters and power-save adjustment data. At power-on, the main microcomputer reads outs these parameters and data through initial communication with the camera microcomputer. Serial data communication is carried out between the main microcomputer and the camera microcomputer.

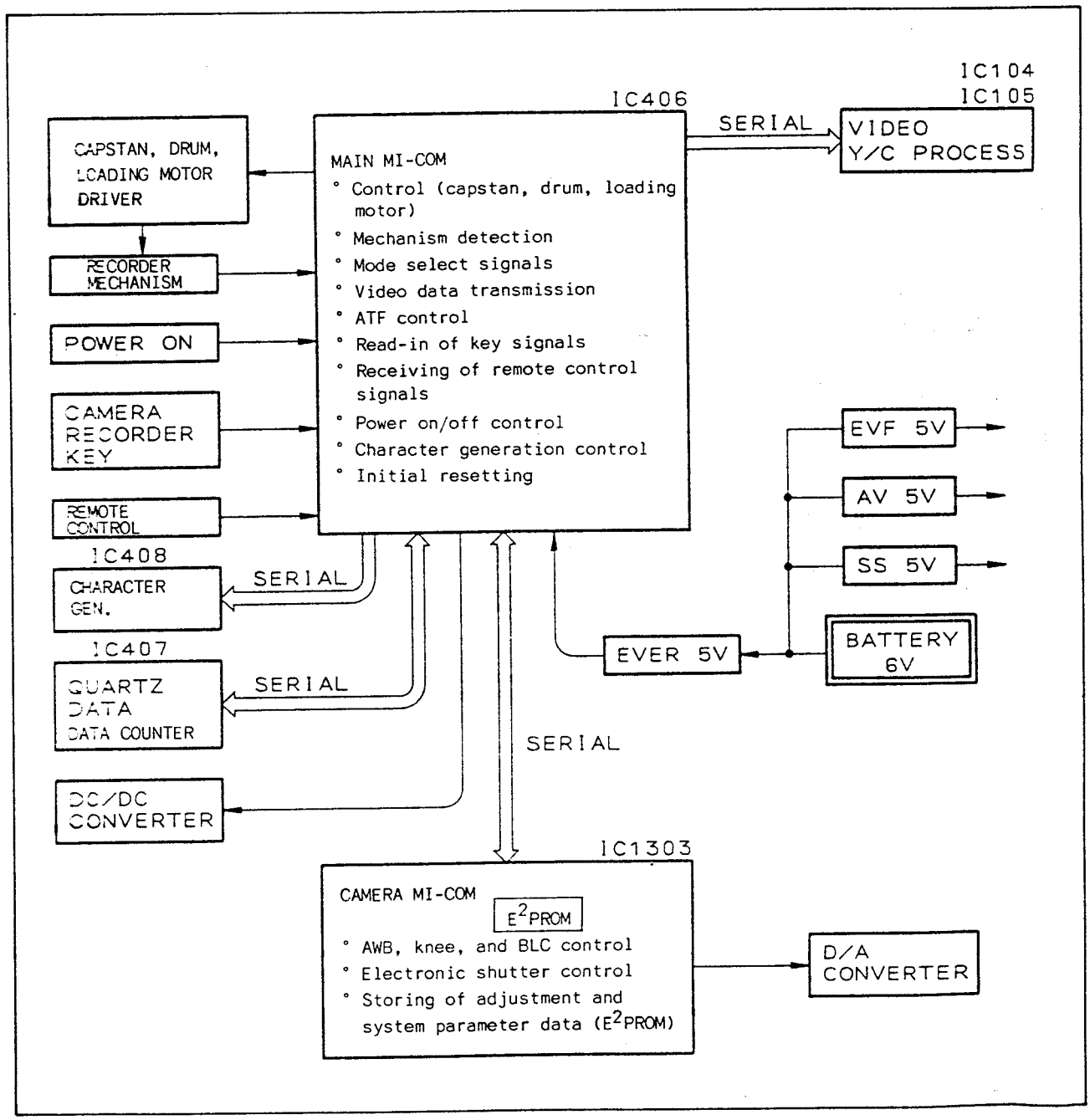


Fig. I-42

4-3-2 Power supply circuit

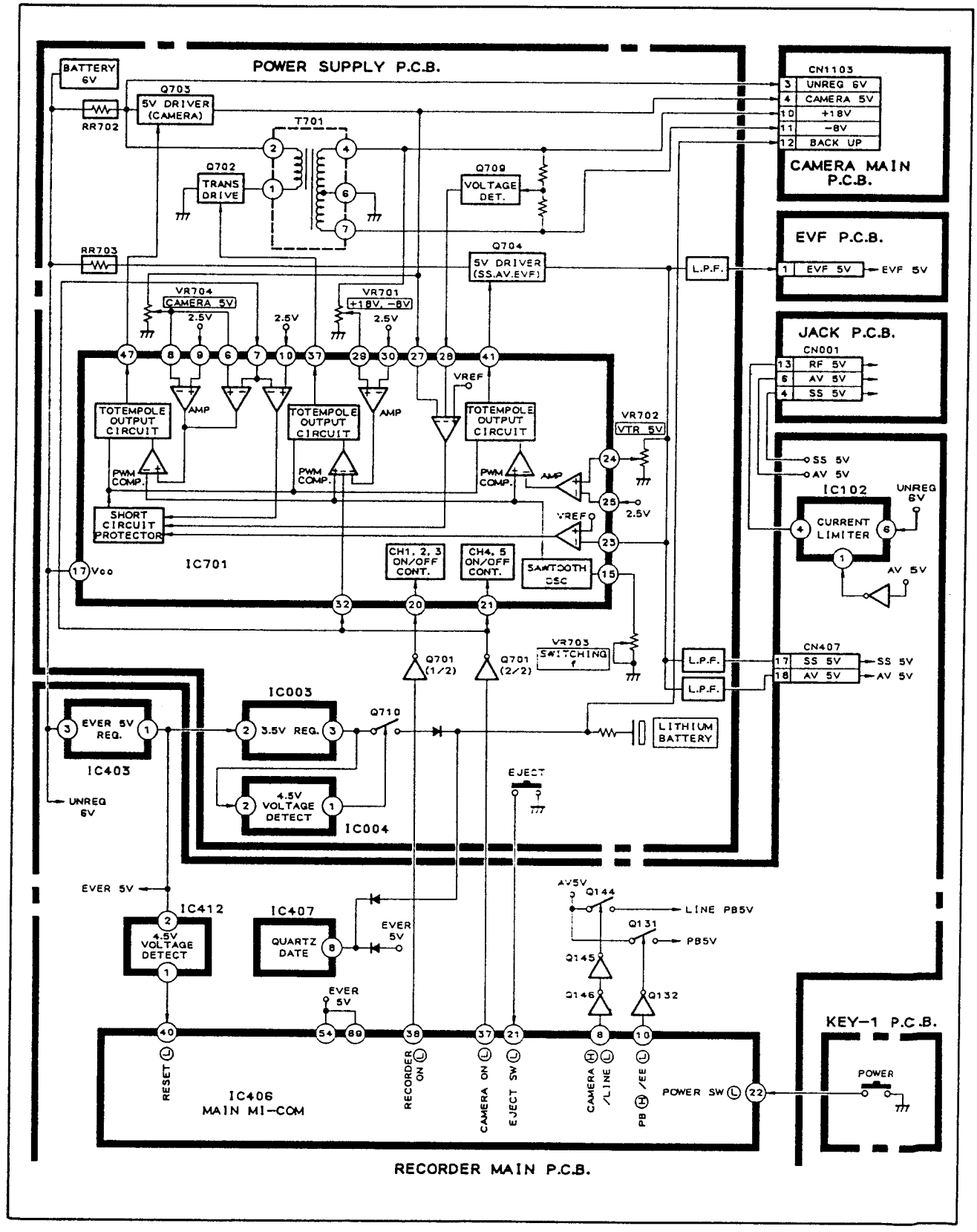


Fig. I-43

(1) Kinds of power sources

Power voltages required for the recorder and camera sections are produced using UNREG 6V supplied from the battery terminal of the POWER SUPPLY P.C.B. Also, the backup power for auto date and digital title is furnished from the rechargeable lithium 3V battery (incorporated in the camcorder).

EVER 5V

When the battery terminal is connected with power supply, EVER 5V power is output through the three-terminal regulator (IC403) mounted on the R-MAIN P.C.B. As long as the power supply is connected, this power voltage is constantly delivered to the microcomputer and the lithium battery for floating-recharge.

SS 5V | AV 5V | EVF 5V

When the POWER switch is turned on, the main microcomputer outputs the RECORDER ON Ⓛ signal from its pin 38. This activates the switching regulator (IC701) to turn on the 5V driver (Q704) for delivering 5V power. Then, after noise elimination through the low-pass filter, each 5V power is supplied to the relevant circuits. AV 5V power is fed to the video circuit, and EVF 5V power is applied to the EVF circuit.

CAMERA 5V

When the POWER switch is turned on, the main microcomputer outputs the CAMERA ON Ⓛ signal from its pin 37. This causes the IC701 to turn on the 5V driver (Q703) for delivering CAMERA 5V power. This power voltage is exclusively used for the camera section.

+18V | -8V

In the same manner as for CAMERA 5V, when the IC701 turns on the transformer driver (Q702), +18V power and -8V power are output from pins 4 and 7 of the transformer (T701) respectively. These power voltages are exclusively used for the camera section.

RF 5V

When UNREG 6V power is fed to pin 6 of the current limiter IC (IC102) mounted on the R-MAIN P.C.B., RF 5V power is output from pin 4. Output of this RF 5V power is allowed only while AV 5V is input to pin 1. The RF 5V power is exclusively used for the RF unit.

PB 5V

When the PB Ⓗ/EE Ⓛ signal is output from pin 10 of the main microcomputer, the transistor switch (Q131) is triggered on to output PB 5V power. This power voltage is exclusively used for the playback circuit.

LINE PB 5V

When the LINE Ⓛ signal is output from pin 8 of the main microcomputer, the transistor switch (Q144) is triggered on to output LINE PB 5V power. This power voltage is exclusively used for the line playback circuit.

LITHIUM 3V

The 3V DC power supplied from the lithium battery (POWER SUPPLY P.C.B.) is used for backing up quartz date (IC407) and digital title when the battery terminal is not connected with power supply. Also, when the EVER 5V is supplied, this power source supplies 3V via the diode on IC003 (3.5V REG) to charge the lithium battery.

(2) Power-up/down sequence

° At resetting when power supply is loaded:

When the battery terminal is connected with power supply, the IC403 mounted on the R-MAIN P.C.B. furnishes EVER 5V power to the main microcomputer. At this step of sequence, the IC412 applies the RESET Ⓛ signal to the main microcomputer for resetting.

After resetting, the main microcomputer enters the sleep mode for stand-by.

° At power-on:

When the POWER switch is turned on, the POWER SW Ⓛ signal is input to the main microcomputer. On receipt of this signal, the main microcomputer is made active to output the RECORDER ON Ⓛ and CAMERA ON Ⓛ signals to the IC701 mounted on the POWER SUPPLY P.C.B. The IC701 (5CH PWM switching regulator) conducts on/off-control for channels 1 to 3 according to the RECORDER ON Ⓛ signal and on/off control for channels 4 and 5 according to the CAMERA ON Ⓛ signal. A feedback loop is formed between the IC710 and Q703, and the CAMERA 5V power output from Q703 is adjusted by VR704 and subjected to PWM processing in IC701. Then, the constant voltage is output through control of Q703. Other power voltages are output in the same sequence.

° At power-off:

When the POWER switch is pressed in the power-on state, the POWER SW Ⓛ signal is input to the main microcomputer. Thereby, the main microcomputer stops each mechanisms and then turns off each power source.

° Cassette ejection at power-off:

When the EJECT switch is pressed, the EJECT SW Ⓛ signal is input to the main microcomputer. On receipt of this signal, the main microcomputer carries out the cassette eject sequence. On completion of cassette ejection, the main microcomputer turns off each power source and then puts itself in the sleep mode.

° Resetting of QUARTZ DATE IC (IC407)

The IC407 is supplied with EVER 5V and LITHIUM 3V power voltages. When the IC407 is turned on, it sends the power-on status data to the main microcomputer through serial communication. On receipt of this status data, the main microcomputer resets the auto date and tape count functions in IC407 through serial communication.

° Shortcircuit protective circuit in IC701

The IC701 is provided with the shortcircuit protective circuit. This circuit is made active if any one of voltages detected at pins 7, 23, 27 and 28 becomes lower than the positive input voltage level of comparator. When the protective circuit is activated, each power source drive is forced to stop. Then, this state is retained while power is applied to IC701. The normal operational condition can be set up again by disconnecting or removing the power supply.

4-3-3 Pin functions of main microcomputer (IC406)

Table I-10 (1/3)

Pin No.	Signal designation	I/O	Function
1	REC Ⓗ	O	REC/PB mode changeover signal for the head amplifier (IC301, 302) and ATF IC (IC701).
2	FE ON Ⓗ	O	Flying-erase oscillation on/off control signal.
3	CH-2B SW	O	Used for preventing crosstalk from other head in playback operation. Each of these signals goes 'High' for muting.
4	CH-1B SW		
5	CH-2A SW		
6	CH-1A SW		
7	NC	-	Open.
8	CAMERA Ⓗ/LINE Ⓛ	O	Camera/line input changeover signal. Goes 'High' for camera input.
9	SP Ⓗ/LP Ⓛ	O	Tape speed changeover control signal.
10	PB Ⓗ/EE Ⓛ	O	PB/EE changeover singal. Goes 'High' for playback operation.
11	JOG Ⓗ	O	RF AGC circuit time-constant changeover signal. Goes 'High' for jogging playback.
12	NC	-	Open.
13	CAPSTAN ON Ⓗ	O	Capstan motor on/off signal. This signal goes 'High' to turn on the capstan motor, and 'Low' to turn it off (braking).
14	CAPSTAN FWD Ⓗ	O	Controls the rotating direction of capstan motor. This signal goes 'High' when the capstan motor runs in the forward direction.
15	LMO LIMIT DET. Ⓛ	I	Goes 'Low' if the loading motor is overloaded.
16	MODE SW3	I	Mechanism mode switch input. (Consists of three bits; Used for detecting mechanical position)
17	MODE SW2		
18	MODE SW1		
19	SAFETY TAB SW Ⓛ	I	Cassette write-protect switch input. Goes 'High' to enable writing.
20	CASSETTE DOWN Ⓛ	I	Goes 'Low' when the cassette compartment moves down.
21	EJECT SW Ⓛ	I	EJECT switch input. Goes 'Low' when the EJECT switch is turned on.
22	POWER SW Ⓛ	I	POWER switch input. Goes 'Low' when the POWER switch is turned on.
23	WIDE Ⓛ	O	Zoom motor wide-angle drive signal. Goes 'Low' to drive the zoom motor for wide-angle shooting.
24	TELE Ⓛ	O	Zoom motor telephoto drive signal. Goes 'Low' to drive the zoom motor for telephoto shooting.
25	AF Ⓗ/MANU. Ⓛ	O	AF on/off control signal. Goes 'High' in autofocusing.
26	DISPLAY ON Ⓛ	O	Viewfinder screen display on/off control signal.
27	V-STROBE 2	O	Video data discrimination signal in serial communication.
28	V-STROBE 1		
29	QD-WRITE	O	QUARTZ DATE IC (IC407) write signal. Goes 'Low' for writing.
30	QD-CS	O	QUARTZ DATE IC (IC407) communication enable signal. Goes 'Low' to enable communication.
31	CG-STROBE	O	Character generation select signal. Goes 'High' in active state.
32	CAMERA-CS	O	Camera microcomputer communication enable signal. Goes 'Low' to enable communication.
33	TAPE SENS. LED	O	Emission control signal for the BOT/EOT detector LED.

Table I-10 (2/3)

Pin No.	Signal designation	I/O	Function
34	TALLY	O	Tally LED on/off control signal. Goes High' to turn on the tally LED.
35	PLAY LED	O	Play-mode LED on/off control signal. Goes 'High' to turn on the play-mode LED.
36	CAMERA LED	O	Camera-mode LED on/off control signal. Goes 'High' to turn on the camera-mode LED.
37	CAMERA ON Ⓛ	O	On/off control signal output for the camera power generating circuit.
38	RECORDER ON Ⓛ	O	On/off control signal output for the video power generating circuit.
39	GND	-	Connected with ground.
40	RESET Ⓛ	I	Main microcomputer reset signal input. Goes 'Low' to reset the main microcomputer.
41	GND	-	Connected with ground.
42	EXTAL	O	Connected with the 12 MHz crystal oscillator.
43	XTAL	I	
44	NC	-	Open.
45	C-DATA	I	Serial communication data input from the camera microcomputer.
46	C/V-DATA	O	Serial communication data output to the camera microcomputer and VIDEO IC (IC104, 105).
47	CLOCK 1	O	Clock output for serial data communication with the VIDEO IC (IC104, 105).
48	ZOOM KEY	I	Zoom direction detecting signal input. This signal goes 'High' upon detection of the telephoto zoom direction, and 'Low' upon detection of the wide-angle zoom direction.
49	KEY (+/-)	I	Camera/recorder key input. The input voltage is used to identify key input.
50	KEY 2		
51	KEY 1		
52	GND	-	Connected with ground.
53	V_{REF}	I	Connected with EVER 5V.
54	V_{DD}	I	Connected with EVER 5V.
55	VIDEO JACK SW	I	Used to indicate whether the video pin jack is connected or not. Goes 'Low' when the video pin jack is connected.
56	STILL ADJ.	I	Used for function check at the factory. Always 'High'.
57	T-REEL FG	I	Takeup reel FG input.
58	S-REEL FG	I	Supply reel FG input.
59	BATT. DET.	I	Used for power-save voltage detection.
60	DEW Ⓗ	I	Dew (moisture condensation) sensor input.
61	ATF ERROR	I	ATF error input.
62	SW POINT ADJ	I	Used for adjustment of switching point.
63	E^2PROM ON Ⓗ	I	Goes 'High' during writing into the E^2PROM to inhibit turn-off of camera power.
64	SP/LP DET.	I	Tape speed detection input.
65	PB-RF DET. Ⓛ	I	PB-RF detection signal. Goes 'Low' upon detection of PB-RF. When PB-RF is not detected, the tape counter is stopped.
66	C-SYNC	I	Rotation servo control sync signal.
67	ATF LOCK	I	In playback, this signal goes 'High' when the ATF servo phase is locked normally.
68	D-PG	I	Drum PG input.
69	D-FG	I	Drum FG input.

Table I-10 (3/3)

Pin No.	Signal designation	I/O	Function
70	C-FG	I	Capstan FG input.
71 72	UNLOAD LOAD	0	Loading motor control signal. Signal/State: LOAD: UNLOAD: BRAKE LOAD: H: L: H UNLOAD: L: H: H
73	DRUM FWD Ⓛ	0	Used to change over the rotating direction of drum motor. Goes 'Low' when the drum motor runs in the forward direction.
74	DRUM ON Ⓗ	0	Drum motor on/off signal.
75	C-PWM	0	PWM signal output for controlling the capstan motor.
76	D-PWM	0	PWM signal output for controlling the drum motor.
77	C-FG	I	Capstan FG input for driving the tape counter.
78	CAMERA REQ	I	Communication request signal from the camera microcomputer. Goes 'Low' to indicate a request of communication.
79	QD-DATA	I	Data input for serial communication with the QUARTZ DATA IC (IC407).
80	QD/CG-DATA	0	Data output for serial communication with the QUARTZ DATE IC (IC407) and CHARACTER GENERATOR IC (IC408).
81	CLOCK 2	0	Clock output for serial communication with the QUARTZ DATE IC and CHARACTER GENERATOR IC.
82	A-MUTE Ⓛ	0	Audio mute signal. Goes 'Low' for muting.
83	BOT Ⓛ	I	Upon detection of the beginning of tape (BOT), this signal goes 'Low' in synchronization with LED emission.
84	EOT Ⓛ	I	Upon detection of the end of tape (EOT), this signal goes 'Low' in synchronization with LED emission.
85	REMOCON	I	Transmission code input from the remote controller.
86 87	NC	-	Open.
88	Vss	-	Connected with ground.
89	EVER 5V	I	Connected with EVER 5V.
90	V_{DD}	I	Connected with EVER 5V.
91	DRUM BRAKE Ⓗ	0	Goes 'High' for braking the drum motor.
92	TS B	0	ATF lock sampling-hold signal. This signal goes 'Low' for sampling, and 'High' for holding.
93	ATF SW	0	ATF BPF changeover signal. Goes 'Low' upon detection of ATF error on f1 or f3 track. Goes 'High' upon detection of ATF error on f2 or f4 track.
94 95	SEL2 SEL1	0	Used for controlling the ATF PILOT signal frequency. PILOT: f1: f2: f3: f4 SEL1: H: L: H: L SEL2: H: H: L: L
96	JOG VD	0	Pseudo VD output inserted into the video signal in jogging playback.
97	1/2 RF SWP	0	1/2 RF SWP output. 15 Hz pulse having a duty factor of 50%.
98	RF SWP	0	RF SWP output. 30 Hz pulse having a duty factor of 50%.
99	ATF N	0	Goes 'High' for ATF error offsetting at power-on.
100	LMO LIMIT CONT.	0	Used to control the loading motor current limiter in the event of overloading. Goes 'High' to turn on the limiter circuit.

4-3-4 Safety functions

To prevent a physical damage or jamming of tape due to improper setting, this camcorder carries out the warning indication processing, key-input rejection, or operational restriction as mentioned below.

(1) Detection of decrease in main battery voltage

The following three low levels of main battery are detectable during operation.

(UNDER CUT 1)
When the voltage level at main battery terminal decreases below 5.70 V for more than two seconds, the POWER LED indicator blinks and the 'BATT' warning message appears on the view-finder screen. Under this condition, the key input and operation are not restricted (the normal operation can be continued). Note, however, that only the POWER and EJECT switches are acceptable after the camcorder is stopped once.

(UNDER CUT 2)
If the main battery voltage level further decreased below 5.50 V for more than two seconds, the power-off state is taken automatically through the stop state.

(SHUT OFF)
If the main battery voltage level (EVER 5V) drops rapidly below 4.5 V, the RESET Ⓛ signal is output from pin 1 of the voltage detector IC (IC412). This resets the main microcomputer to immediately turn power off.

° Detector circuit:

The UNREG 6V power supplied from the main battry is divided through the resistor, and the divided voltage level is detected via pin 59 of the main microcomputer. Under condition that 5.70 V is present at the main battery terminal, the divided voltage level appearing at pin 59 is stored into the E^2PROM built in the camera microcomputer. This divided voltage value is given to the main microcomputer through serial data communication. Comparing the stored voltage value with the voltage applied to pin 59, the main microcomputer detects 'UNDER CUT 1' or 'UNDER CUT 2' to take the power-saving sequence.

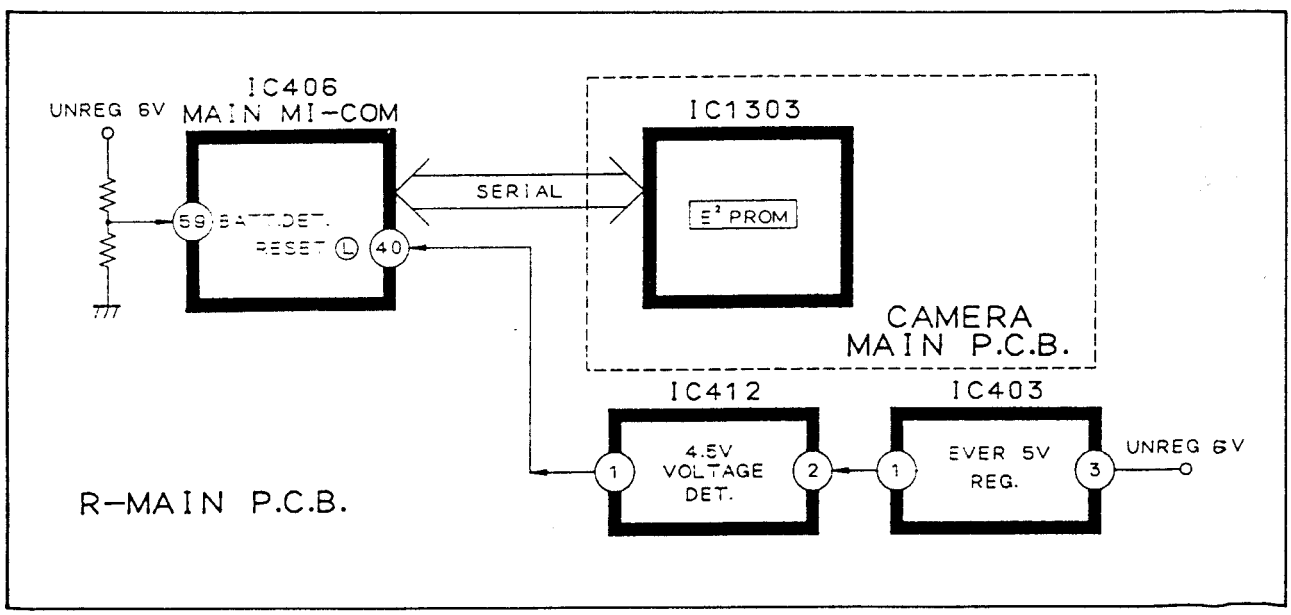


Fig. I-44

(2) Dew condensation

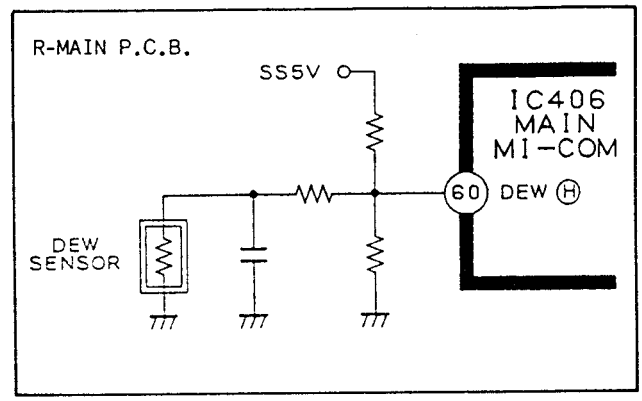


Fig. I-45

The dew (moisture condensation) detecting function is provided to circumvent jamming of tape due to possible sticking.

If moisture condensation is detected during operation, the LED indicator (red or green) blinks for warning. Also, 'DEW' blinks on the viewfinder screen to let the user know detection of moisture condensation. Under this condition, the mechanism is put in the stop state and the tape loading sequence is not carried out even if the tape cassette is inserted. Upon detection of moisture condensation, the one-hour timer of the microcomputer is made active to hold 'DEW' indication unless the power supply is disconnected. Under the 'DEW' condition, the cassette eject function is available for unloading with the drum stopped.

On occurrence of moisture condensation, the dew sensor equipped on the mechanical chassis increases its resistance to increase the DEW detection voltage applied to pin 60 of the main microcomputer (IC406). If the level of this voltage rises above the predetermined value, the main microcomputer recognizes moisture condensation and carries out the relevant sequence.

(3) End-of-tape check

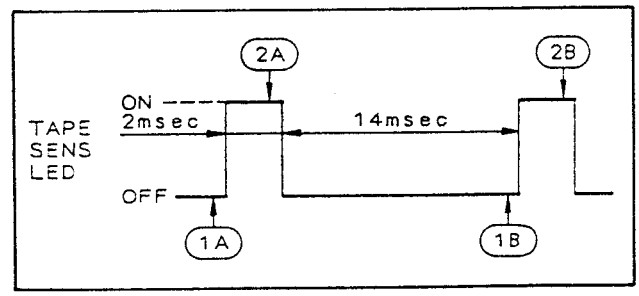


Fig. I-46

If the videotape is run beyond its end, the tape guide may be damaged or the head drum may be squeezed with the tape. To prevent such an event, the end-of-tape check is conducted to detect the end of tape during operation. Upon detection of the end of tape, the tape is stopped immediately.

The end-of-tape detecting LED is turned on/off with the TAPE SENS LED signal appearing at pin 30 of the main microcomputer (IC406). In any mode, this LED indicator flashes in a cycle indicated in Fig. I-46. If the signal input across pins 83 and 84 goes 'Low' twice in succession, the main microcomputer recognizes the end of tape. A read-in of this signal is performed with timing 2A/2B indicated in Fig. I-46. If the 'Low' state of signal is found with timing 1A/1B, the main microcomputer judges that it is caused by external light. Thus, it cancels detection of the end of tape.

Also, if the EOT and BOT input signals go 'Low' twice in succession, the main microcomputer judges the cassette is not loaded. In this case, 'TAPE' blinks on the viewfinder screen.

(4) Pause timer

In the REC PAUSE or STILL mode, the head drum rotates with the tape wound around it. If this condition persists for a certain period of time, the tape may wear or the head may be contaminated. To prevent this, if the REC PAUSE mode is kept for five minutes, it is automatically changed over to the STOP mode and the power is turned off. If the STILL mode is kept for five minutes, it is automatically changed over to the STOP mode with the power being turned on.

(5) Trouble stop (error)

If any trouble occurs in the rotation drive mechanism (drum, capstan, loader, reel), the tape may be jammed or the mechanism may be damaged. To prevent this, the fault control sequence specified for each mode is carried out upon detection of an error. In the event of trouble, the POWER LED indicator flashes and 'EJECT' blinks on the viewfinder screen for warning.

Table I-11

Event	Condition	Drum error
Drum error	1. Error detection state : At sart/normal operation 2. FG frequency at normal operation: 225 Hz 3. Error detection level At start : Less than 112.5 Hz At normal operation : Less than 22.5 Hz At emergency : D-PWM on-period ... More than 93% 4. Error detection period At start : 2 sec At normal operation : 0.5 sec At emergency : 100 msec continuously after start-up	Pin 69 of IC406 (D-FG)
Capstan error	1. Error detection state : At start/normal operation 2. FG frequency at normal operation: 1340 Hz 3. Error detection level At start : Less than 268 Hz At normal operation : Less than 54 Hz 4. Error detection period : 2 sec	Pin 70 of IC406 (C-FG)
Reel error	1. Error detection state : At normal operation 2. Error detection : More than 2048 C-FG pulses in half cycle of takeup/supply reel FG sequence. (Only on the side of takeup reel)	Pins 57 and 58 of IC406 (T/S-REEL FG) Pin 70 of IC406 (C-FG)
Loading error	1. Error detection state : At mode transition 2. Error detection : Proper positioning not accomplished within a predetermined period of time EJECT ⟷ UNLOAD 2 sec. UNLOAD ⟷ STOP 5 sec. STOP ⟷ PINCH ON 2 sec.	Pins 16, 17 and 18 of IC406 (MODE SW)

Table I-12

(Processing after error detection)

	CASSETTE-IN	LOADING in progress	UNLOADING in progress	LOADING completed	TAPE RUNNING	MODE TRANSITION in progress
Drum error	POP-UP 1	POP-UP 1	POP-UP 2	ERROR STOP	ERROR STOP	ERROR STOP
Capstan error	ERROR STOP	ERROR STOP	ERROR STOP	ERROR STOP	ERROR STOP	ERROR STOP
Reelerror	-	-	ERROR STOP	ERROR STOP	ERROR STOP	ERROR STOP
Loading error	POP-UP 1	POP-UP 1	ERROR STOP	ERROR STOP	-	ERROR STOP

° POP-UP 1 : Error indication → Unloading → POP-UP → Error clear
° POP-UP 2 : Error indication → Eject due to dew → POP-UP → Error clear
° ERROR STOP: Error indication → Stop position (Error indication is not cleared unless the cassette is ejected.)

4-3-5 Data communication

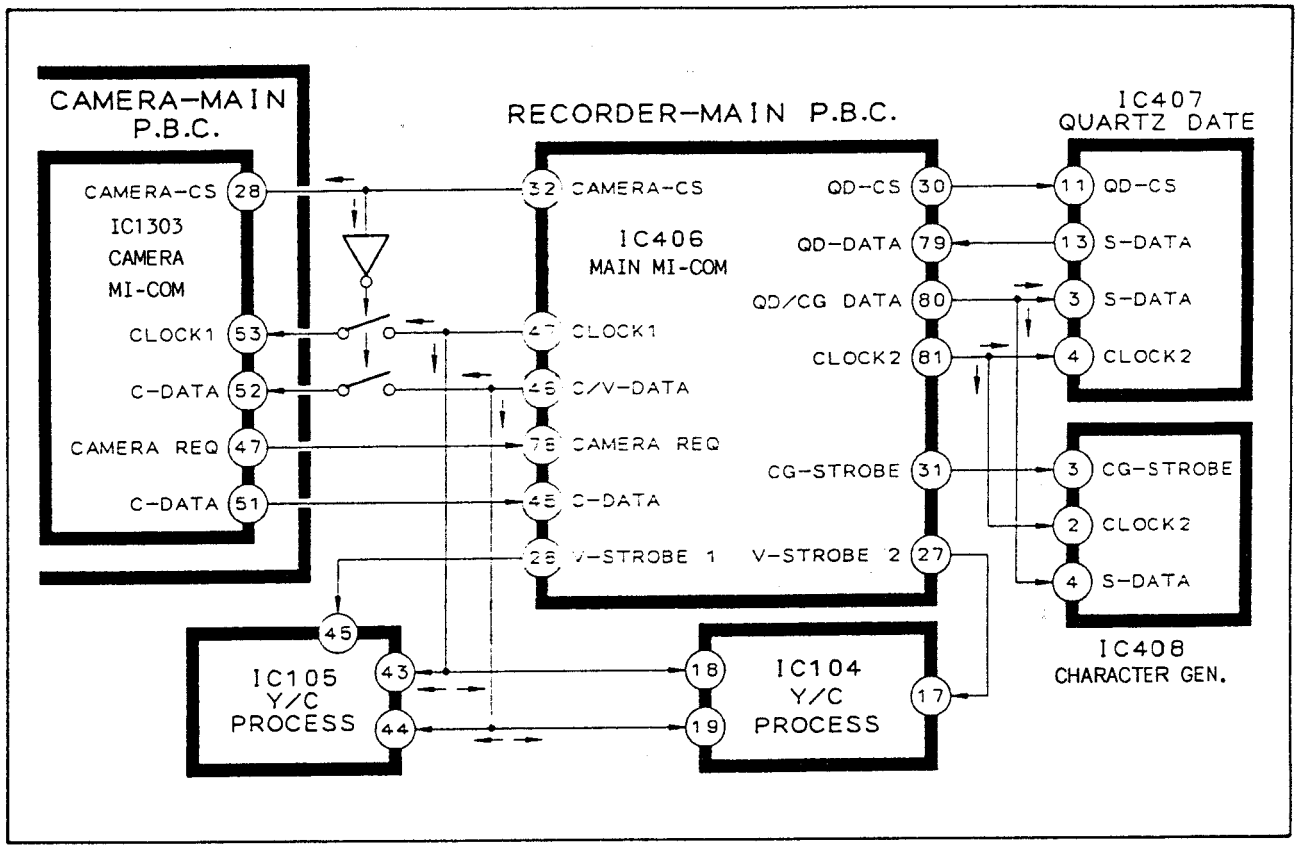


Fig. I-47

Data signals are interchanged among the microcomputers and ICs as described below. These communication sequences are carried out around the main microcomputer.

Bidirectional communication
- Main microcomputer ⟷ Camera microcomputer
- Main microcomputer ⟷ QUARTZ DATE IC

Unidirectional communication
- Main microcomputer ⟶ CHARACTER GENERATOR IC
- Main microcomputer ⟶ VIDEO SIGNAL PROCESS IC

(1) Bidirectional communication between the main microcomputer and the camera microcomputer

Bidirectional communication between the main microcomputer (IC406) and the camera microcomputer (IC1303) is carried out on a basis of 8 bits x 6 words. In this communication, the mode/operation instruction is sent to the camera microcomputer, and data is read from or written into the E^2PROM of camera microcomputer.

1) The CAMERA REQ signal appearing at pin 47 of the camera microcomputer goes 'Low' to indicate a communication request to the main microcomputer. Then, in answer to this request, the main microcomputer turns the CAMERA-CS signal appearing at pin 32 to 'Low' level to establish a communication line. Thus, serial data communication is initiated.

2) On completion of data interchange, the main microcomputer turns the CAMERA-CS signal to 'High' level and the camera microcomputer sets the CAMERA REQ signal to 'High' level. Thus, serial communication is terminated.

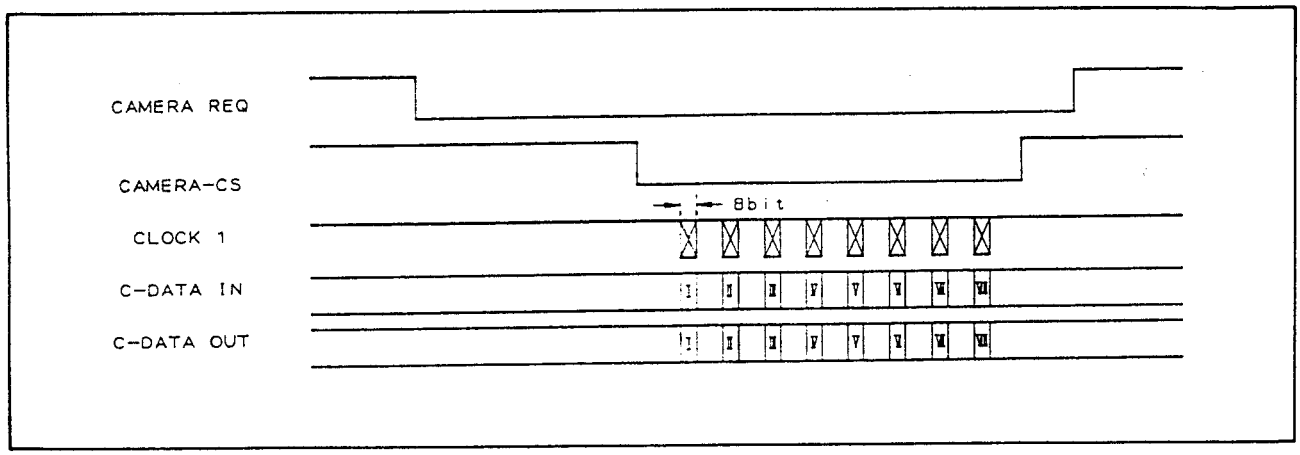


Fig. I-48

(2) Bidirectional communication between the main microcomputer and the QUARTZ DATE IC

Bidirectional communication between the main microcomputer and the QUARTZ DATE IC (IC407) is carried out on a basis of 8 bits x 1 word. After communication with the camera microcomputer, the main microcomputer uses the remaining time alternately for communication with the QUARTZ DATE IC and CHARACTER GENERATOR IC.

For communication with the QUARTZ DATE IC, the main microcomputer turns the QD-CS signal appearing at pin 30 to 'Low' level. While this signal remains 'Low', data is interchanged with the QUARTZ DATE IC (tape count, auto date, etc.).

(3) Unidirectional communication from the main microcomputer to the CHARACTER GENERATOR IC

Unidirectional communication from the main microcomputer to the CHARACTER GENERATOR IC (IC408) is carried out on a basis of 8 bits x 1 word. In a cycle of vertical scanning, the main microcomputer communicates with the CHARACTER GENERATOR IC and QUARTZ DATE IC alternately as mentioned above. In this unidirectional communication, the character data to be displayed on viewfinder screen is sent from the main microcomputer to the CHARACTER GENERATOR IC.

After outputting the character generation data from pin 80, the main microcomputer issued the CG-STROBE signal from pin 31 to indicate that the character generation data has been sent.

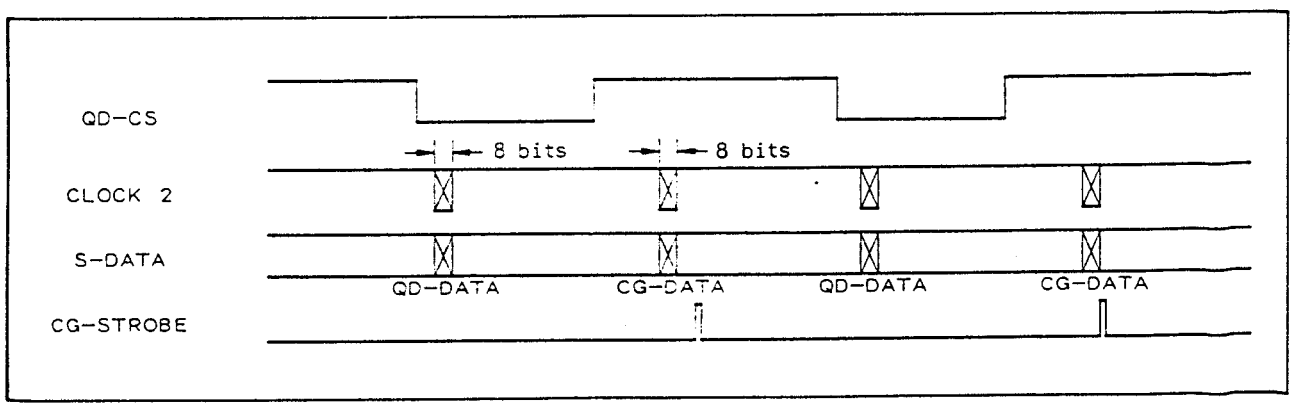


Fig. I-49

(4) Unidirectional communication from the main microcomputer to the VIDEO SIGNAL PROCESS IC

In the video signal processing circuit, the Y/C PROCESS functional block consists of IC104 and IC105. Unidirectional communication from the main microcomputer to IC104 is carried out on a basis of 8 bits x 3 words, and unidirectional communication from it to IC105 is carried out on a basis of 8 bits x 8 words. In these unidirectional communications, the main microcomputer transmits the operation mode data (RECORDING mode, PLAYBACK mode, etc.).

When the V-STROBE 2 signal appearing at pin 27 of the main microcomputer becomes 'Low', the IC104 reads in data. And, when the V-STROBE 1 signal appearing at pin 28 of the main microcomputer becomes 'Low', the IC105 reads in data.

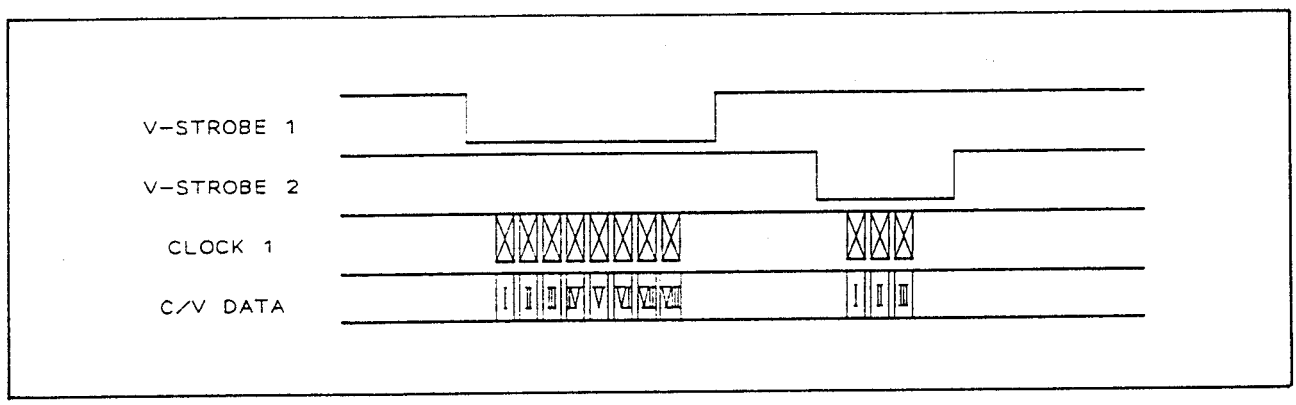


Fig. I-50

4-3-6 Servo circuit

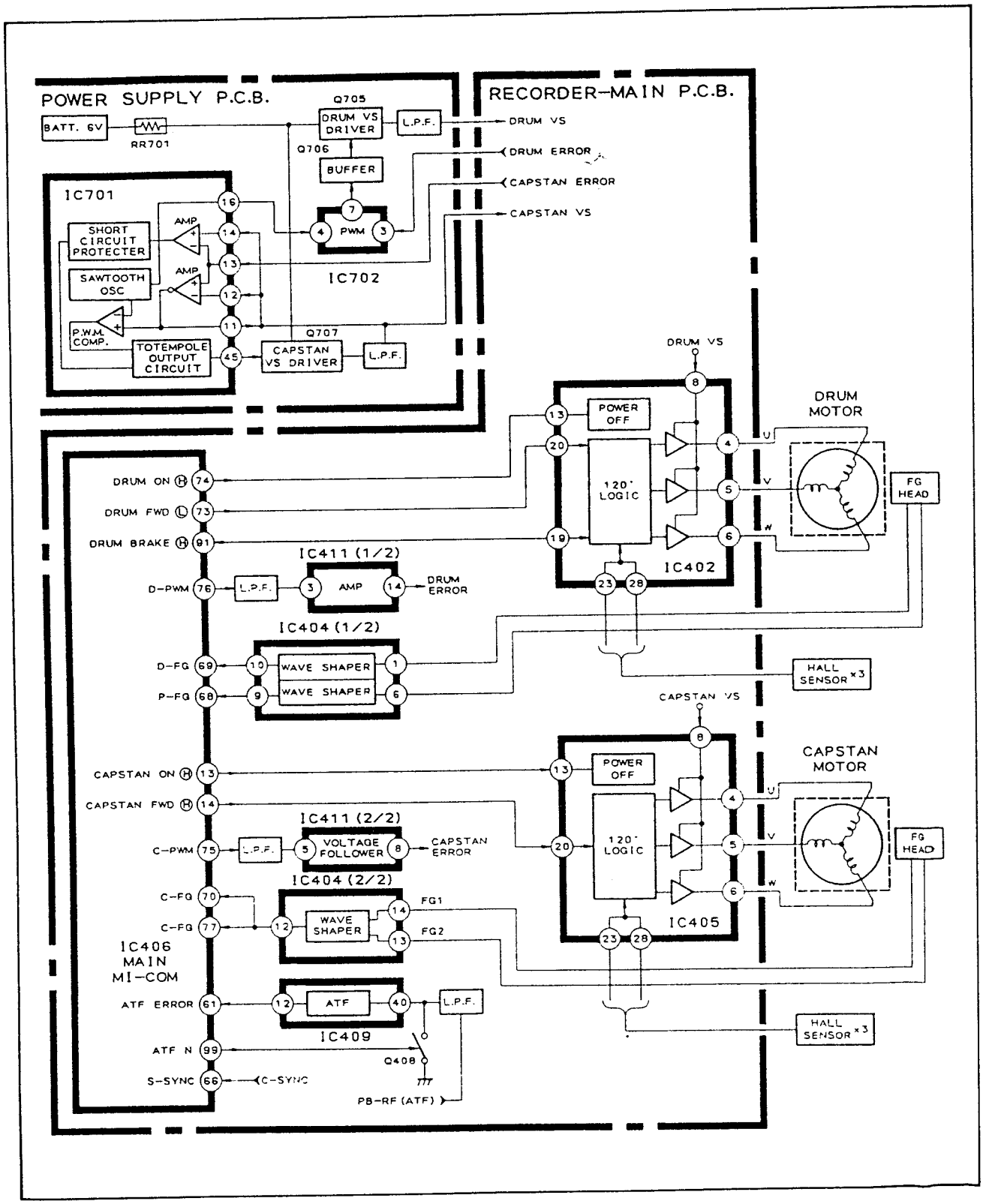


Fig. I-51

The drum and capstan servoloops are controlled under direction of the main microcomputer (IC406) mounted on the R-MAIN P.C.B. The software servocontrol function is carried out by the servoloop hardware contained in the main microcomputer. On the POWER SUPPLY P.C.B., the DRUM VS and CAPSTAN VS voltages are generated and furnished in the same manner as for CAMERA 5V.

(1) Drum servocontrol

In recording, the drum motor is driven at a constant speed in synchronization with the signal input to pin 66. In playback, it is driven at a constant speed in synchronization with the internal counter of main microcomputer.

The minuscule outputs from the FG and PG coils equipped on the drum motor are subjected to waveform shaping in IC404 and then applied to pins 69 and 68 of the main microcomputer. The D-FG signal has a frequency of 225 Hz under normal condition, and it is used for speed servocontrol through comparison with the internal reference signal. The D-PG signal is output at a rate of two pulses per rotation of the drum, and it is used for phase servocontrol through comparison with the internal reference signal.

The main microcomputer outputs a speed/phase servo error from pin 76 using the D-PWM signal. This D-PWM signal output from pin 76 goes through the low-pass filter and amplifier for DC voltage conversion, and then the DC voltage signal is input to pin 3 of IC702 mounted on the POWER SUPPLY P.C.B. In IC702, the DC voltage signal is reconverted into the PWM signal. The PWM signal output from IC702 activates the DRUM VS DRIVER IC, and its output signal is fed to pin 8 of the DRUM MOTOR DRIVER IC (IC402). Thus, the drive voltage for each of U, V and W phases is produced for the drum motor.

The U/V/W switching of drum motor is conducted by detecting the rotor position with three Hall-effect elements.

Starting of the drum motor is controlled by the DRUM ON Ⓗ signal output from pin 74 of the main microcomputer. The rotating direction is controlled by the DRUM FWD Ⓗ signal output from pin 73 of the main microcomputer. And, for braking of the drum motor, the DRUM BRAKE Ⓗ signal output from pin 91 is used.

(2) Capstan servocontrol

The FG1 signal from the capstan motor and the FG2 signal having the reserve phase are subjected to waveform shaping by IC404. Then, these signals are frequency-multiplied (doubled) respectively to provide logic-level inputs to the main microcomputer. In recording, the frequency is 1340 Hz. On receipt of these input signals, the main microcomputer carries out speed servocontrol and phase servocontrol. In playback, the ATF ERROR signal input to pin 61 is used to conduct phase servocontrol. As in the drum servocontrol sequence, the C-PWM signal (result of servocontrol) is output pin 75. This C-PWM signal goes through the low-pass filter and voltage follower for DC voltage convertion, and then the DC voltage signal is input to pin 13 of IC701 mounted on the POWER SUPPLY P.C.B. In IC701, the DC voltage signal is reconverted into the PWM signal. The PWM signal output from IC701 activates the CAPSTAN VS DRIVER IC, and its output signal is fed to pin 8 of the CAPSTAN MOTOR DRIVER IC (IC405). Thus, the drive voltage for each of U, V and W phases is produced for the capstan motor.

The U/V/W switching of capstan motor is conducted by detecting the rotor position with three Hall-effect elements.

Starting of the capstan motor is controlled by the CAPSTAN ON Ⓗ signal output from pin 13 of the main microcomputer. And, the rotating direction is controlled by the CAPSTAN FWD Ⓗ signal output from pin 14.

4-3-7 Video circuit

For reduction in power consumption, the video circuit in this camcorder adopts the new type of signal processing IC (IC105). This contributes to substantial decrease of current consumed for camera recording. The video signal processing scheme in this camcorder is different from that in the conventional model.

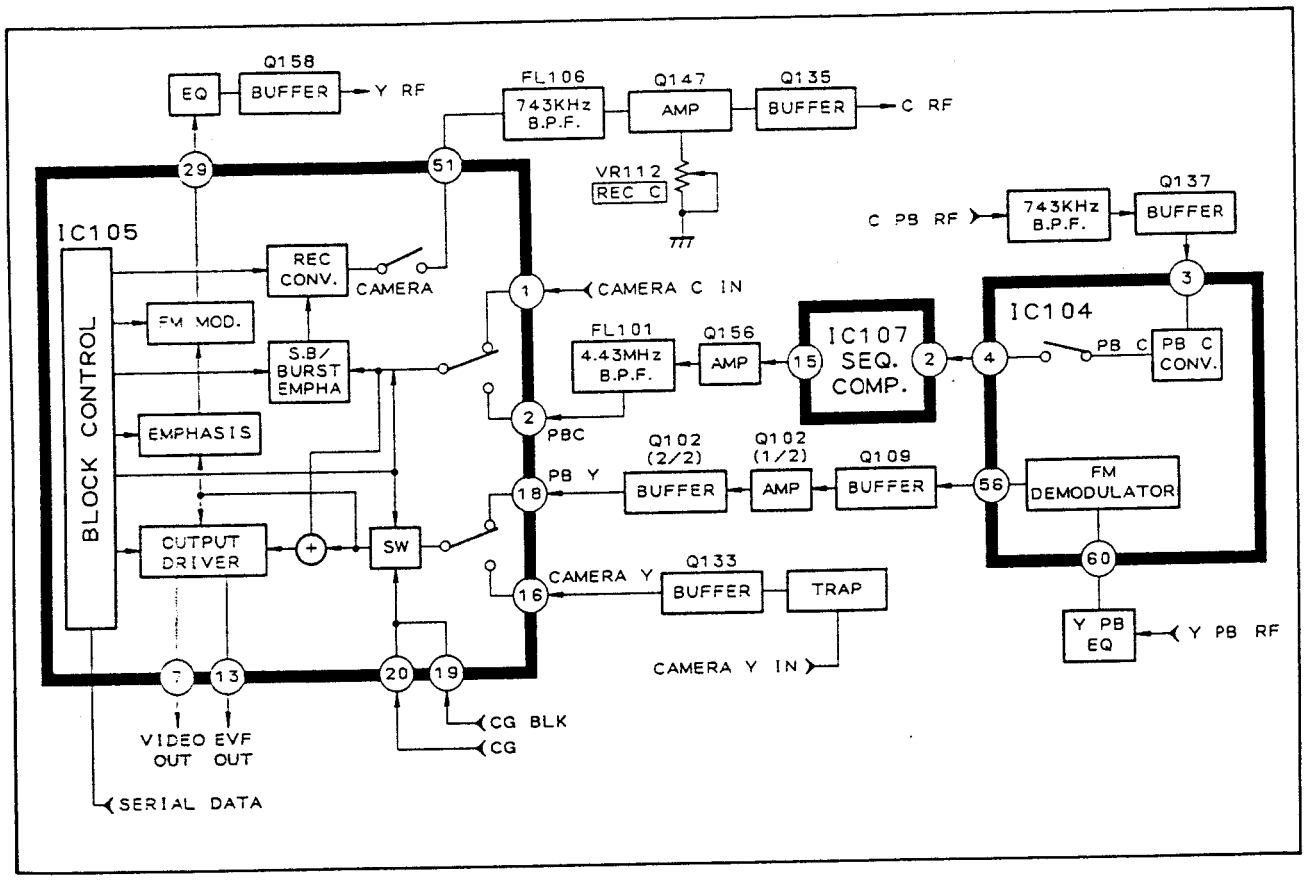


Fig. I-52

The video circuit is supplied with the following signals; Y and C signals from the camera circuit, and Y PB RF and C PB RF signals from the head amplifier in playback. Described below are the processing sequences of these isgnals.

(1) CAMERA REC processing

The Y and C signals fed from the camera circuit are processed by the newly developed IC (IC105).

1) Y signal

The Y signal from the camera circuit is input to pin 16 of IC105, and in IC105, it is mixed with the character signal received from the recording circuit. Then, the mixed signal is emphasized and frequency-modulated, and the output signal comes out of pin 29. After conversion into recording current, the Y signal is applied to the head amplifier for recording on video tape. In IC105, the EVF and EE output sequences are also carried out. The CAMERA Y signal input to pin 16 is switched internally for EVF output and EE output. For EVF output, the Y signal is processed to allow on-screen display and output as the EVF OUT signal from pin 13. For EE output, the Y signal is mixed with the CAMERA C signal and output as the VIDEO OUT signal from pin 7. (When the connector is not plugged into the video pin-jack, the VIDEO OUT singal is not output.)

2) C signal

The chroma signal from the camera circuit is input to pin 1 of IC105. It is emphasized, down-converted to 743 kHz, and output from pin 51. This output signal is subjected to chroma equalization and level adjustment and then fed to the head amplifier. In the same manner as for the Y signal, the C signal (EE line) is switched internally in IC105 and mixed with the Y signal. Then the mixed signal is output as the VIDEO OUT signal from pin 7.

(2) PB processing

1) PB Y signal

The Y PB RF signal output from the head amplifier is input to pin 60 of IC104 through the RF equalizer. In IC104, it is frequency-demodulated and output from pin 56 as the video signal. This video signal is fed to pin 18 of IC105 and mixed with the PB character signal. Thus, the PB Y signal is output from pin 7 and also from pin 13 to the viewfinder.

2) PB C signal

The C PB RF signal output from the head amplifier is input to pin 3 of IC104 through the 732 kHz band-pass filter. Then, it is up-converted to 4.43 MHz in IC104, and fed from pin 4 of IC104. After phase-corrected at IC107, it is fed to the 4.43 MHz amplifier and then band-bass filter, and finally it is sent to pin 2 of IC105. This chroma signal is mixed with the PB Y signal in 105 and output from pin 7 as the VIDEO OUT signal.

4-3-8 Audio circuit

The audio signal processing is carried out on the JACK P.C.B. and RECORDER MAIN P.C.B. Except the automatic wind-swept noise suppressing function, the audio signal processing sequence is the same as that in the conventional monophonic circuit. Described below is the sequence of the automatic wind-swept noise suppressing circuit.

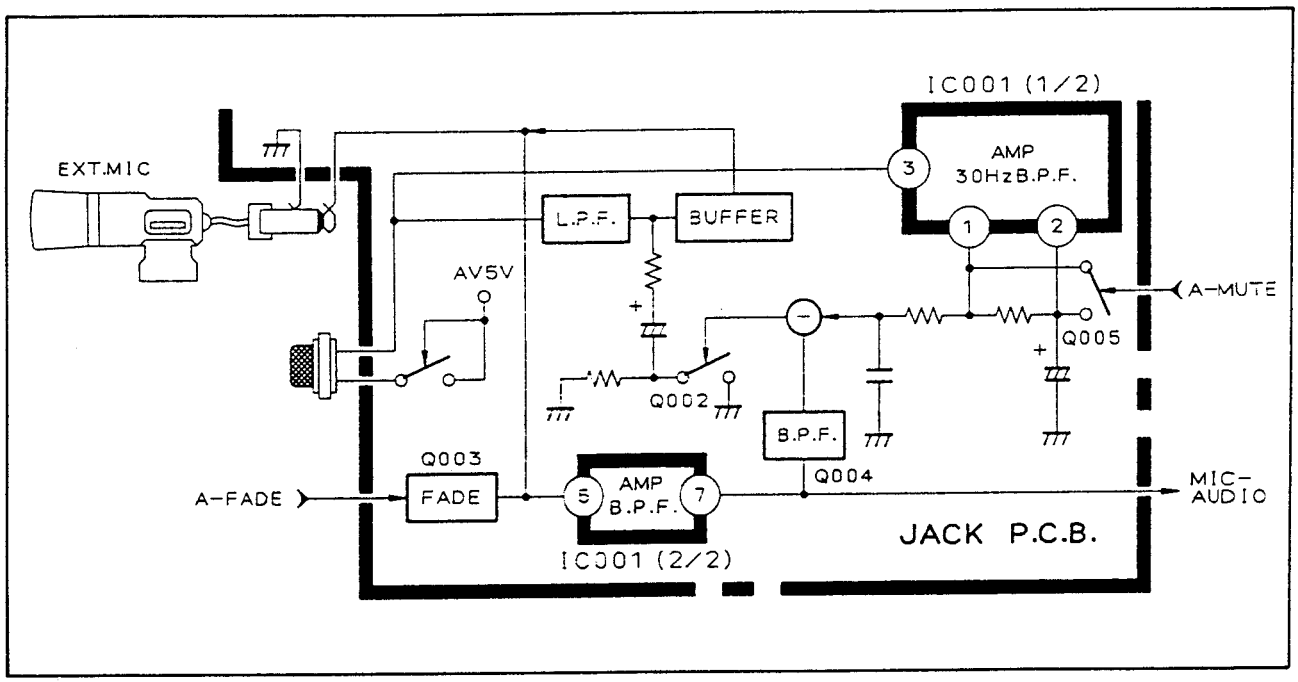


Fig. I-53

The audio signal output from the built-in microphone is applied to the external microphone jack through the low-pass filter and buffer. If the external microphone jack is not connected, the audio signal is turned and fed as the MIC-AUDIO output signal to the audio signal processing circuit (of conventional design) on the RECORDER MAIN P.C.B.

For wind-swept noise suppression, the low-frequency component (30 Hz) amplified in IC001 (1/2) is subtracted from the intermediate-frequency component (200 Hz to 4 kHz) amplified in IC001 (2/2). If the low-frequency component is larger than the intermediate-frequency component, the audio signal is recognized as wind-swept noise and Q002 is triggered on. This alters the cut-off frequency of low-pass filter to reduce wind-swept noise.

When the A-FADE signal is input from the CAMERA MAIN P.C.B., Q003 is triggered on for simultaneous fading-in/out of image and sound. Also, at power-on, the A-MUTE signal is input to turn on Q005 so that the voltage applied to IC001 (1/2) increases to the startup level. Thus, the IC001 (1/2) can be made active quickly when power is turned on.

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CHAPTER II. DISASSEMBLING/ADJUSTMENTS

1. Before Disassembling/Adjustments

1-1 Maintenance tools and supplies

1-1-1 List of maintenance tools and supplies

Table II-1

Maintenance tools

DESCRIPTION	TOOL NO.	REMARKS
Alignment tape E (monosco)	DY9-1062-000	
Y/C separator	DY9-1093-500	
Extension cable	DY9-1125-000	New
Extension cable	DY9-1126-000	New
Extension cable	DY9-1127-000	New
Color bar chart	DY9-2002-000	
Gray scale chart	DY9-2005-000	
Adjusting screwdriver (2.6 mm)	DY9-2021-000	
Phillips screwdriver (2 bits only)	DY9-2030-000	
Adjusting screwdriver (1.8 mm)	DY9-2041-000	
Color chart viewer (5600°K)	DY9-2039-500-220	Europe (except U.K.), HK, etc.
	DY9-2039-500-240	U.K. only
View lamp (5600°K)	DY9-2040-000	
ND-2.0 filter (100 x 100 mm)	DY9-2044-000	
CCA 12 filter ϕ46	DY9-2046-000	
Character generator	DY9-1115-000	

Table II-2

Supplies

DESCRIPTION	TOOL NO.	REMARKS
Grease GE-X8	CY9-8044-000	
Teflon Fluorocarbon Resin MP-102	DY9-3013-000	
Dia Bond 1663	DY9-3008-000	
Floil G-474B	DY9-3024-000	
Grease LT-SH	CY9-8033-000	
Floil G902	DY9-3017-000	
Grease GE-C9	CY9-8043-000	

Note: For recorder mechanism, refer to the mechanism manual for the UC mechanical chassis (DY8-3391-504-201) separately issued.

1-1-2 List of extension cables (Fig. II-1)

Use the following extension cables.

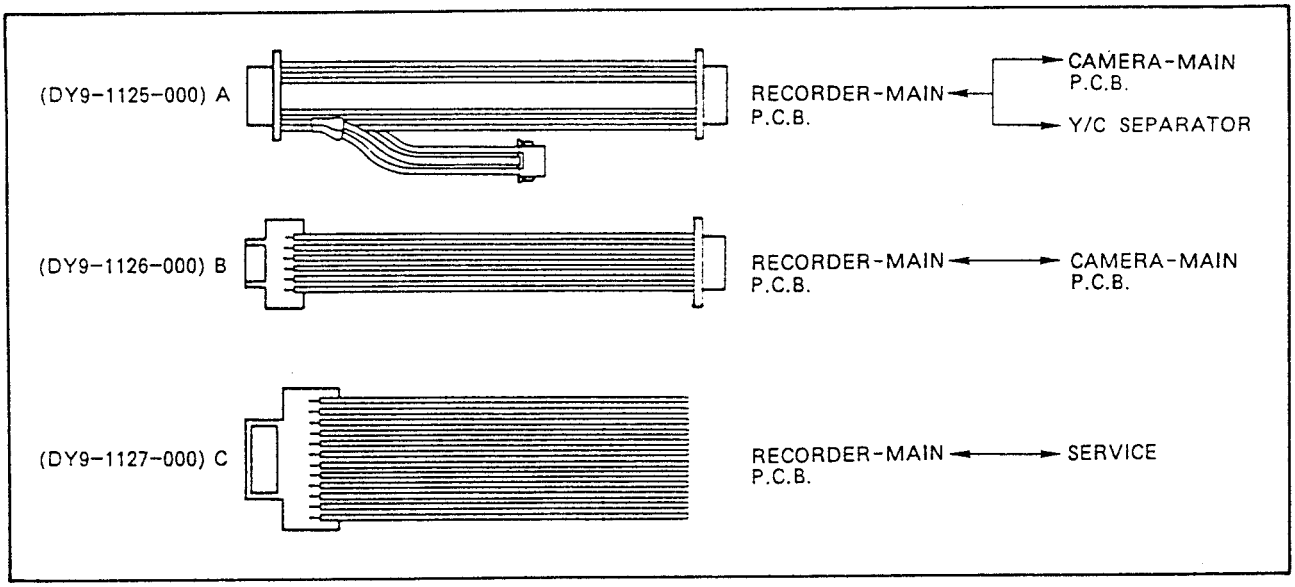


Fig. II-1

2. Disassembling

2-1 Cover disassembling

2-1-1 Removal of hood and front cover (Fig. II-2)

(1) Peel off the hood seal.
(2) Loosen one screw (a).
(3) Turn the hood counterclockwise against the stopper, and remove it.
(4) Loosen one screw (a), two (b), two (c) and one (d), and remove the front cover.
(5) Remove the microphone and AV cover.

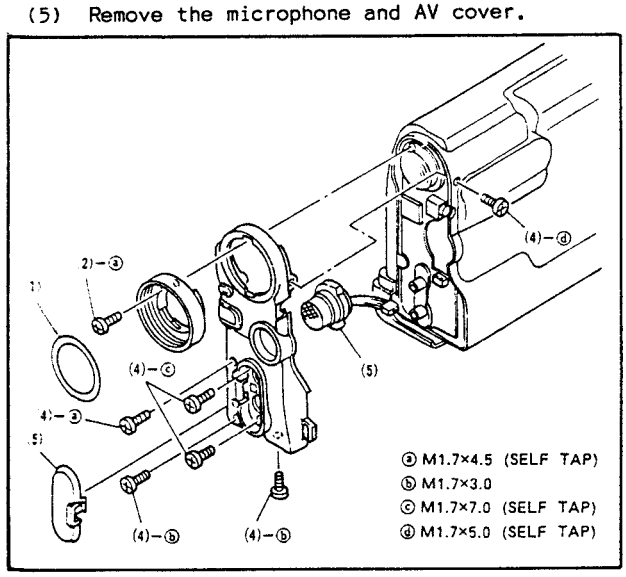


Fig. II-2

2-1-2 Removal of rear cover (Fig. II-3)

(1) Loosen one screw (a), two (b), one (c), one (e), one (f) and one (p).
(2) Remove the rear cover.

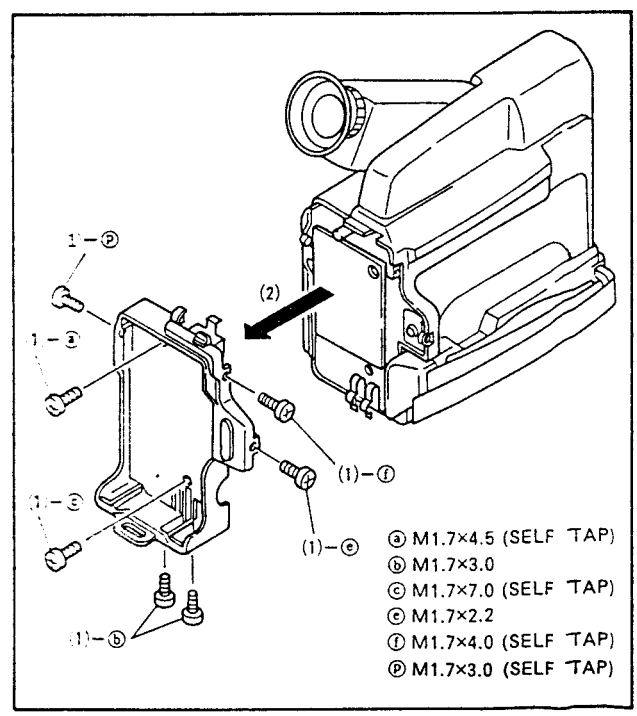


Fig. II-3

2-1-3 Removal of remote controller and cassette cover (Fig. II-4)

(1) Pushing the unlock switch, open the video cassette holder cover outward.
(2) Remove the remote controller.
(3) Loosen two screws (g), and remove the cassette cover.

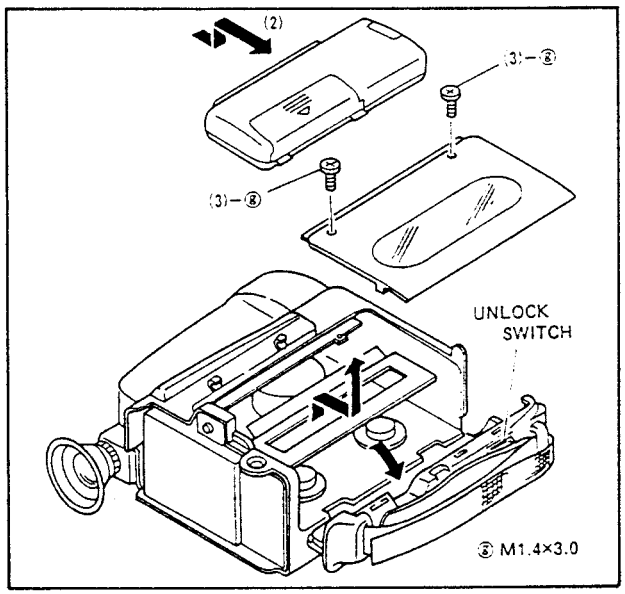


Fig. II-4

2-1-4 Removal of right cover (Fig. II-5)

(1) Peel off the seal (indicating Shoot).
(2) Loosen four screws (a) and two (e).
(3) Remove the right cover from upward, disengage CN101 and CN402, and take out the right cover.

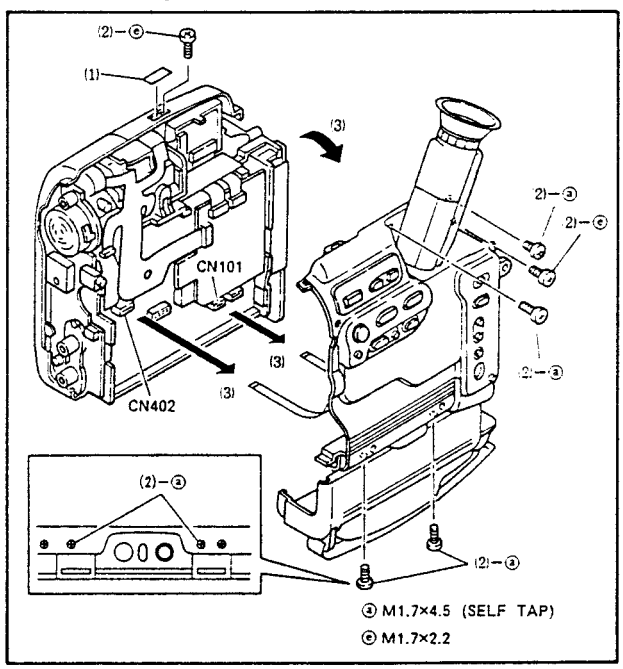


Fig. II-5

2-1-5 Removal of EVF and KEY-2 P.C.B. (Fig. II-6)

(1) Loosen two screws (h).
(2) Remove FERRITE RING, EVF, retainer plate, rotation rubber, ball and spring.
Note: For reassembling, refer to 2-2-8 Instruction for supplies.
(3) Loosen three screws (h), seven screws (q), and remove KEY-2 P.C.B.

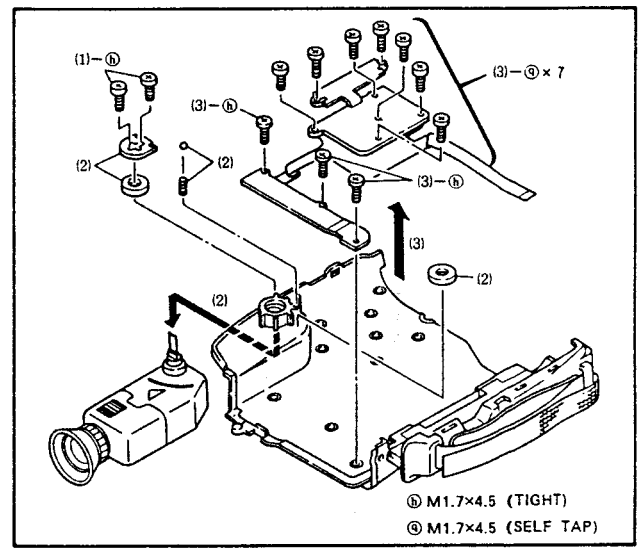


Fig. II-6

2-1-6 Removal of cassette holder cover (Fig. II-7)

(1) Loosen two screws (a), two (e), two (i) and two (j).
(2) Remove the bonded reinforcing plate.
(3) Pull out the bonded hinge shift (A) by pincers or the like.
(4) Pull out the cassette holder cover together with the tripod fixing section and hinge shaft (B) from the left cover.
(5) Pull out the bonded hinge shaft (B) and remove the tripod fixing section.
Note: For reassembling, refer to 2-2-8 Instruction for supplies.

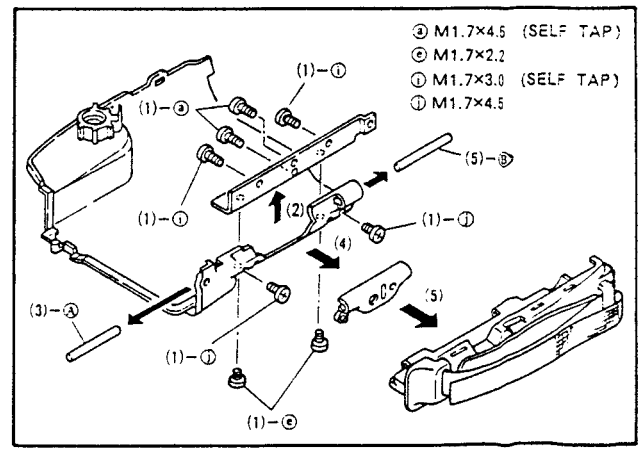


Fig. II-7

2-1-7 Removal of left cover, KEY-1 P.C.B. and strap fixture (Fig. II-8)

(1) Disengage CN401.
(2) Release three dowels (A), and take out the left cover.
(3) Loosen four screws (h), and remove KEY-1 P.C.B. and strap fixture.

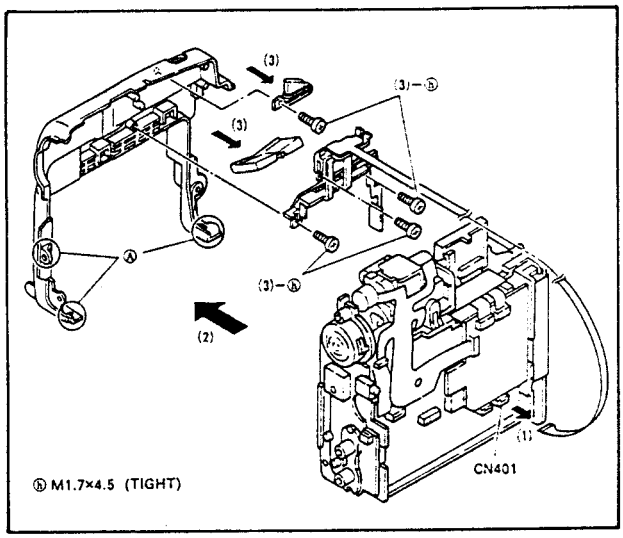


Fig. II-8

2-1-8 Cassette holder cover disassembling (Fig. II-9)

(1) Loosen four screws (h), one (f) and one (k).
(2) Remove the bottom cover plate, lock shaft, unlock switch and spring.
(3) Remove the grip belt.

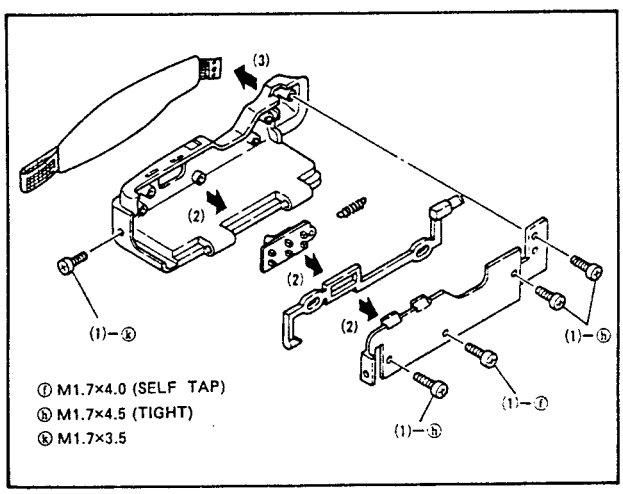


Fig. II-9

2-1-9 EVF disassembling (Fig. II-10)

(1) Loosen two screws (d).
(2) Separate the EVF right and left covers. (Held by four claws (A) inside. Remove while jerking the EVF right cover outward.)
(3) Disengage the claw (B), and remove the EVF P.C.B.

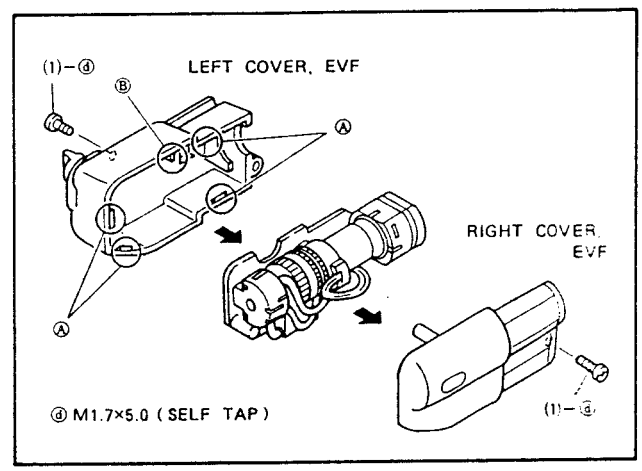


Fig. II-10

2-2 Interior disassembling

2-2-1 Lens unit separation (Fig. II-11)

(1) Disengage CN1002 and CN1501.
(2) Loosen three screws (f).
(3) Remove the lens unit.

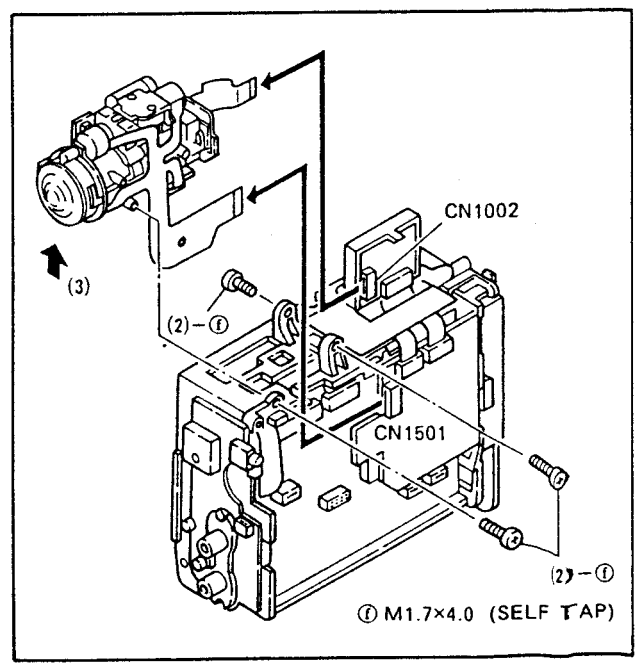


Fig. II-11

2-2-2 Removal of SENSOR and C-MAIN P.C.B. (Fig. II-12)

(1) Remove the shield A, and disengage CN1101 and CN1102.
(2) Disengage the SENSOR P.C.B.
(3) Loosen one screw (l) and pull out C-MAIN P.C.B. this side.

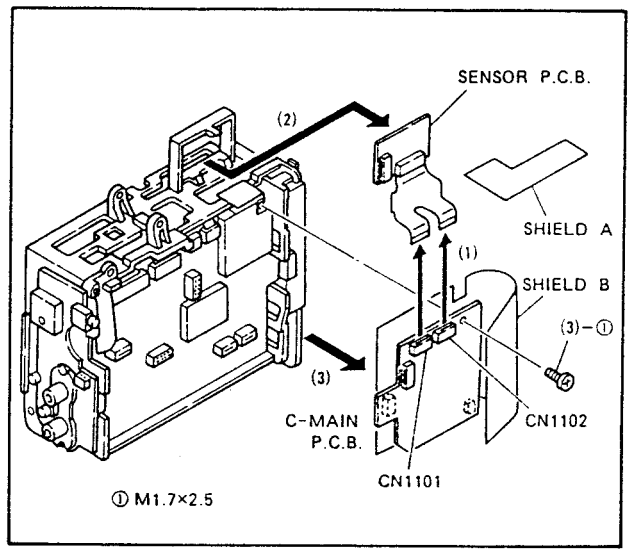


Fig. II-12

2-2-3 Removal of JACK and POWER SUPPLY P.C.B. (Fig. II-13)

(1) Loosen one screw (f) and two (l).
(2) Pull the JACK and POWER SUPPLY P.C.B. outward.
Note: When mounting the POWER SUPPLY P.C.B., engage its connector securely.

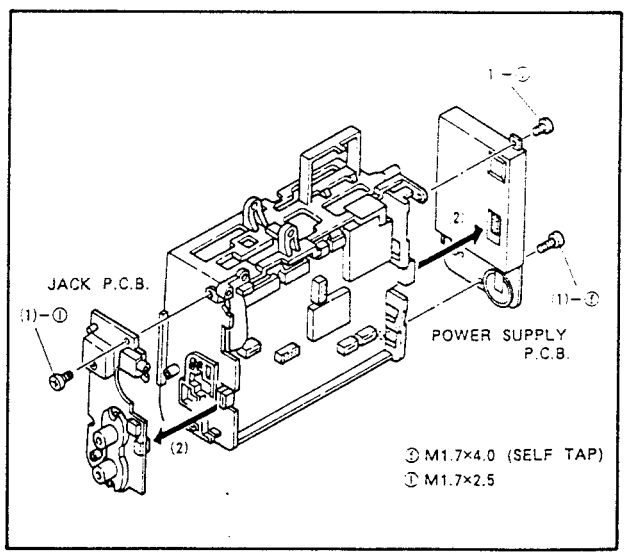


Fig. II-13

2-2-4 Removal of lens holder and R-MAIN P.C.B. (Fig. II-14)

(1) Loosen one screw (c), three (f), two (l) and two (m).
(2) Remove R-MAIN P.C.B. holder (B) and lens holder.
(3) Disengage CN301, 403, 404, 405, 408 and 409.
(4) Remove R-MAIN P.C.B.

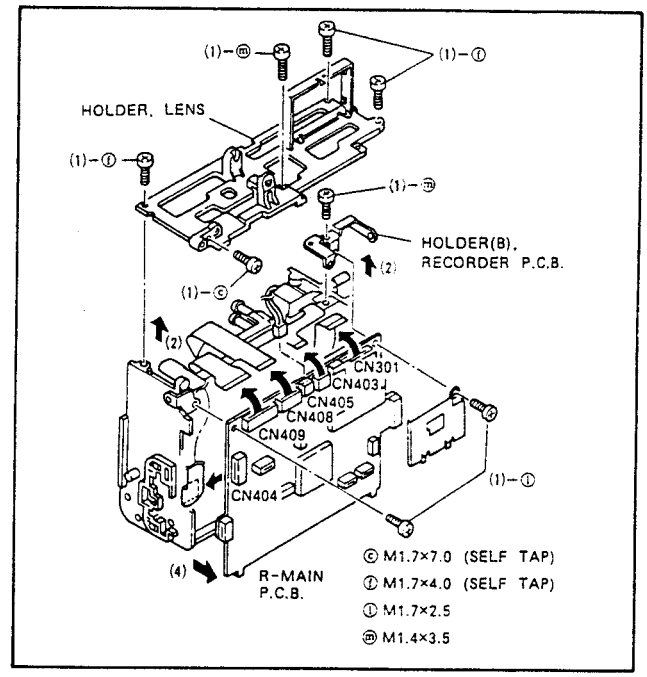


Fig. II-14

2-2-5 Removal of holder (Fig. II-15)

(1) Loosen six screws (m).
(2) Remove the recorder holder, R-MAIN P.C.B. holder (A) and recorder reinforcing plate.

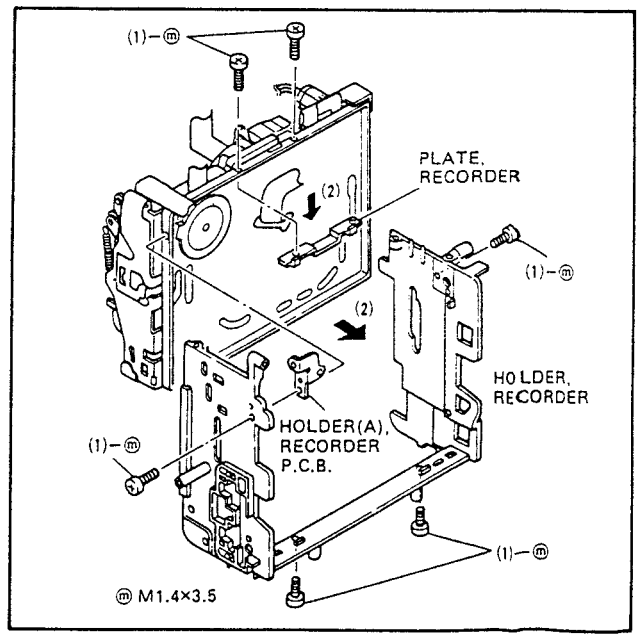


Fig. II-15

2-2-6 Removal of CCD assembly (Fig. II-16)

(1) Loosen two screws (f).
(2) Remove CCD assembly, CCD rubber and crystal filter.

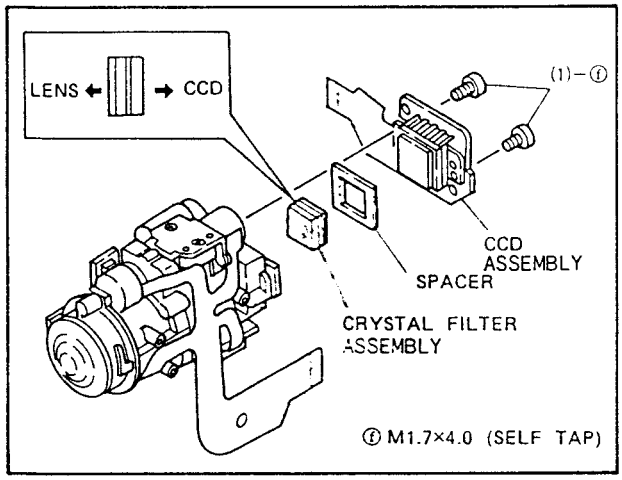


Fig. II-16

2-2-7 POWER SUPPLY P.C.B. disassembling (Fig. II-17)

(1) Unsolder 5 parts (A), and remove shiled case 2.
(2) Unsolder 2 parts (B), and remove shield case 1.

Handling of lithium battery:
1. Carry out soldering within 5 seconds at a soldering iron temperature of 350°C or within 10 seconds at 260°C.
2. The battery must not be heated to 100°C or higher. A reverse voltage must not be applied to it. Do not short-circuit the battery. Otherwise, leakage, burst or firing might occur.

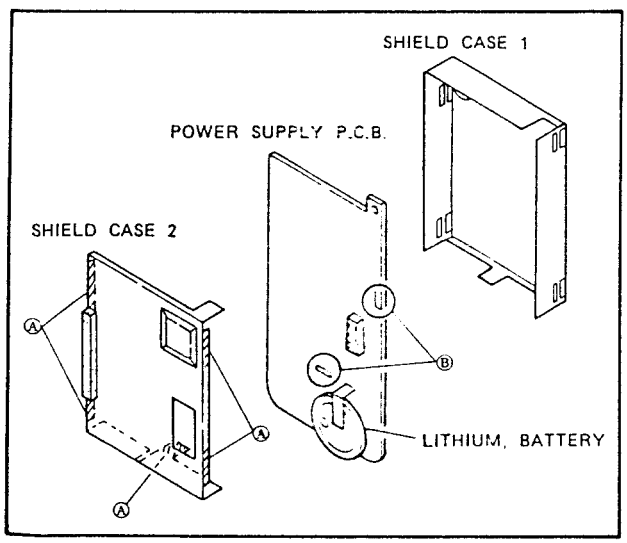


Fig. II-17

2-2-8 Instruction for supplies (Fig. II-18)

When assembling, use the following supplies at points shown in Fig. II-18.

(A) : Dia Bond 1663 (DY9-3008-000)
(B) : Grease LT-SH (CY9-8033-000)

Note: The bond must not stain moving parts and external parts.

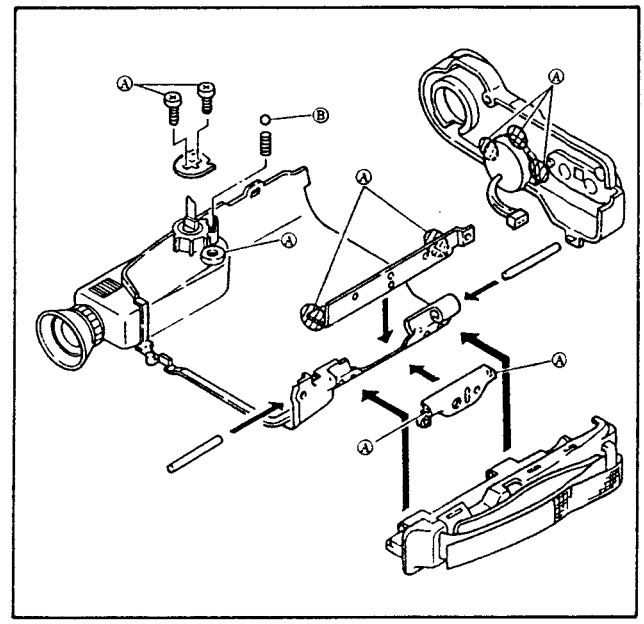


Fig. II-18

2-3 Lens section disassembling

2-3-1 Removal of P.C.B. and motor (Fig. II-19)

(1) Disengage CNs A, B and C.
(2) Loosen five screws ⓝ.
(3) Remove the zoom encoder P.C.B., RESET P.C.B., AF motor and PZ motor.

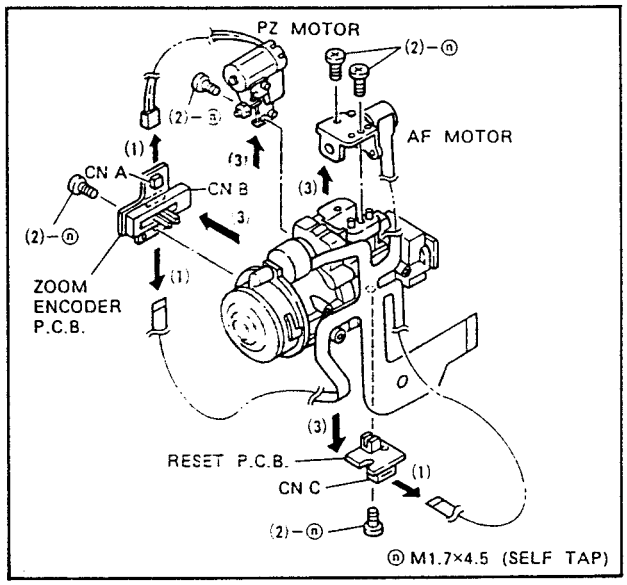


Fig. II-19

2-3-2 Removal of front lens assembly and IG meter (Fig. II-20)

(1) Loosen two screws ⓞ, and take out the front lens assembly and IG meter.
(2) Remove the zoom lens group together with the screw bar.
Note: Spring and ball pin are inside. Do not pull out the screw bar from the zoom lens group.
(3) Remove the bar.

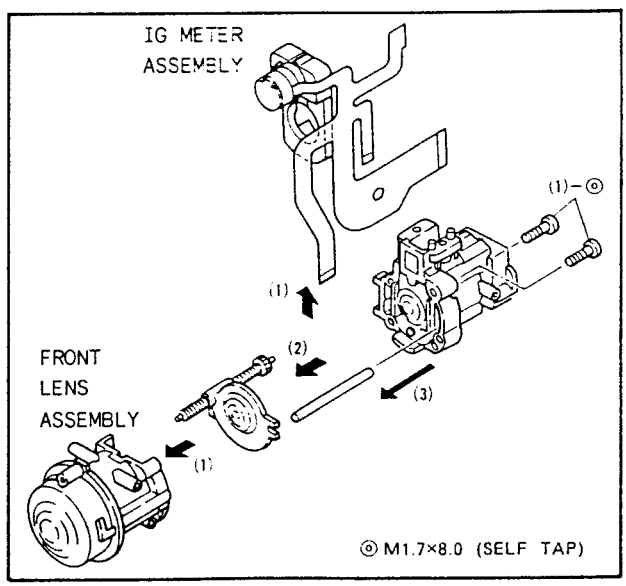


Fig. II-20

2-3-3 Relay holder disassembling (Fig. II-21)

(1) Remove the afocal mask this side.
(2) Remove two bars and focus lens group.

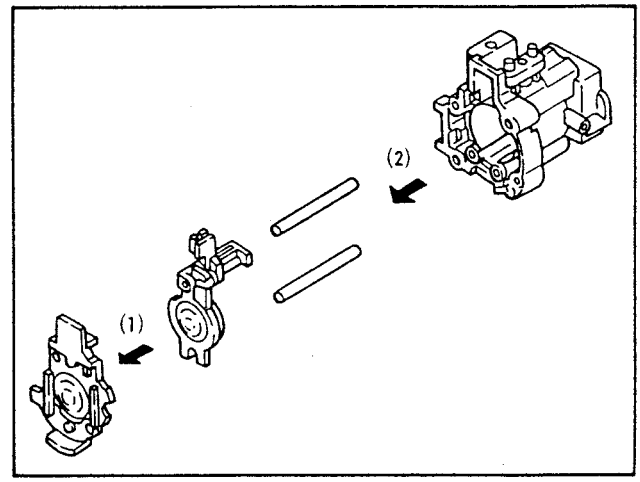


Fig. II-21

2-3-4 Instruction for supplies (Fig. II-22)

After cleaning, replacement, etc., use the following supplies at points shown in Fig. II-22.

Ⓐ Floil G-474B (DY9-3008-000)
Ⓑ Mix the grease GE-C9 (CY9-8043-000) and GE-X8 (CY9-8044-000) at a proportion of:
GE-C9 : GE-8X = 1 : 2 (in weight)
Ⓒ Mix the grease GE-C9 (CY9-8043-000) and Teflon Fluorocarbon Resin MP-102 (DY9-3013-000) at a proportion of:
GE-C9 : MP-102
= 10 : 3 (in weight)
Ⓓ Floil G902 (DY9-3017-000)
Ⓔ Grease GE-C9 (CY9-8043-000)

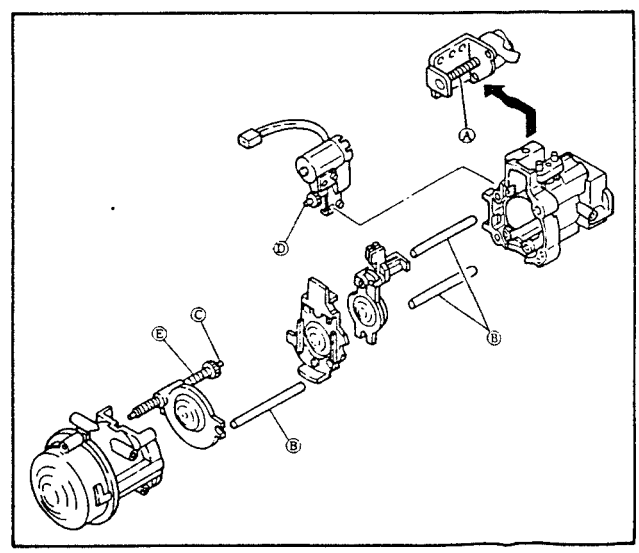
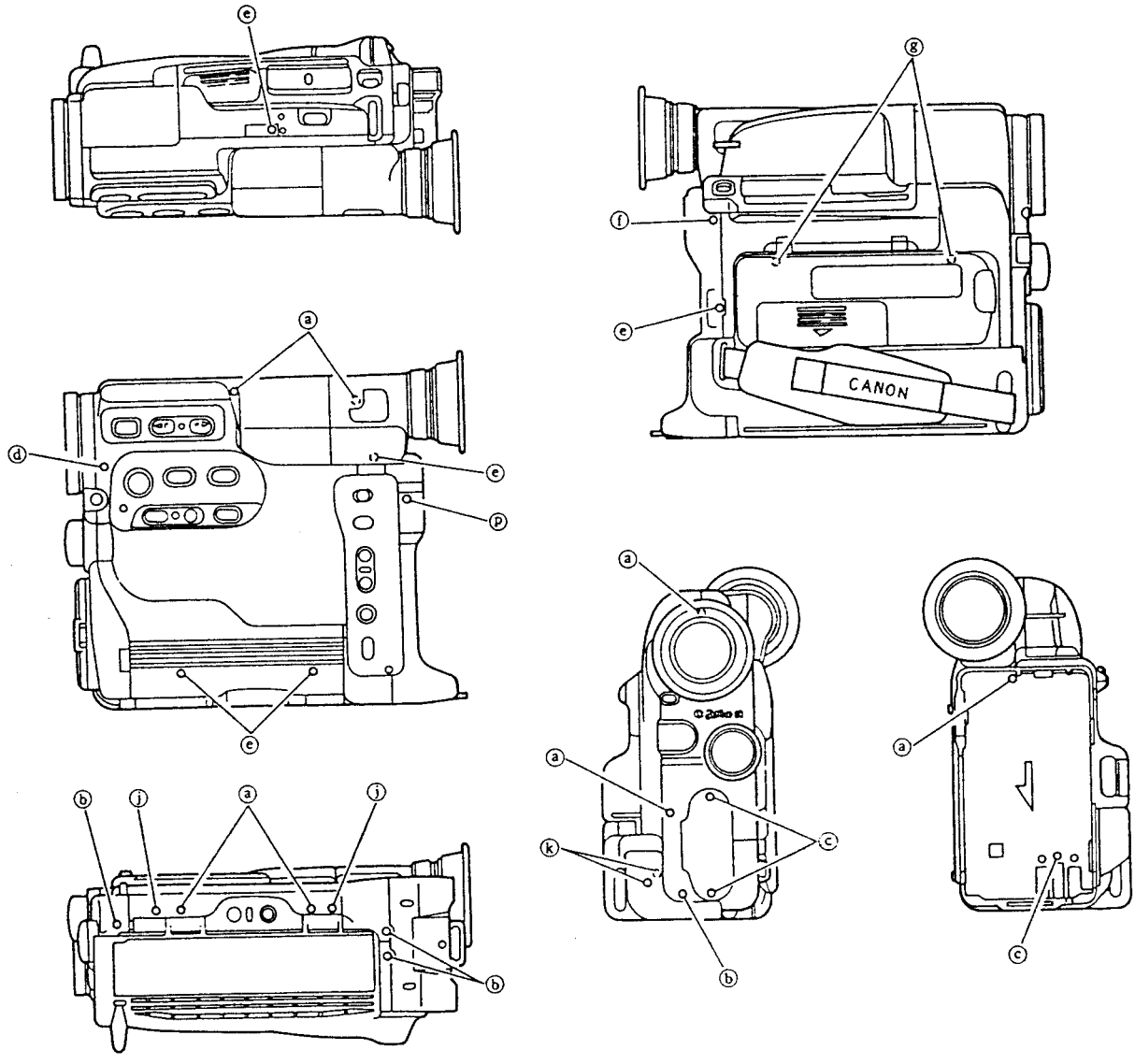


Fig. II-22

2-4 List of external screws (Fig. II-23)



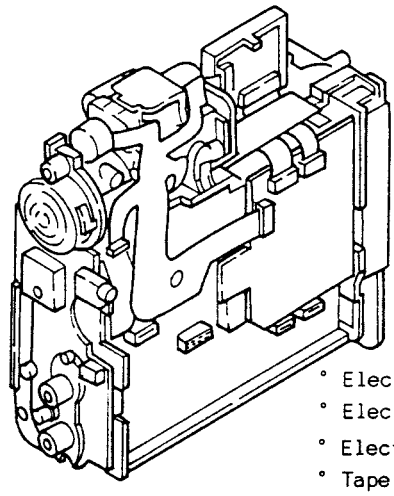
Part No.	Size
ⓐ XA4-9170-459	M1.7×4.5 (SELF TAP)
ⓑ XA1-7170-309	M1.7×3.0
ⓒ XA4-9170-709	M1.7×7.0 (SELF TAP)
ⓓ XA4-9170-509	M1.7×5.0 (SELF TAP)
ⓔ XA1-7170-229	M1.7×2.2
ⓕ XA4-9170-409	M1.7×4.0 (SELF TAP)
ⓖ XA1-7140-309	M1.4×3.0
ⓙ XA1-7170-509	M1.7×4.5
ⓚ XA1-7170-359	M1.7×3.5
Ⓟ XA4-9170-309	M1.7×3.0 (SELF TAP)

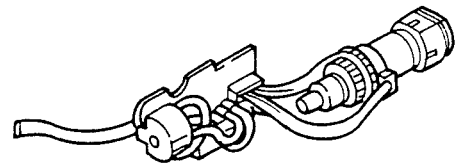
Fig. II-23

3. Preparation for Adjustment

3-1 Adjustment of this instrument

There are following adjustments for the instrument. (Fig. II-24)





° EVF adjustment

° Electrical adjustment of AF
° Electrical adjustment of camera
° Electrical adjustment of recorder
° Tape path adjustment

Fig. II-24

(1) Adjusting mode and setting type

Table II-3

Adjustment		Mode	Setting type
Electrical adjustment of AF		Normal	Setting 1 (+ character generator tool)
Electrical adjustment of camera	VR, VC adjustment	Normal	Setting 1
	Microcomputer adjustment	Service mode	Setting 1
Electrical adjustment of recorder	VR, VC adjustment	Normal	Setting 2
	Microcomputer adjustment	Service mode	Setting 1
	Under-voltage adjustment	Service mode	Completed product status (need not be disassembled) *1
Recorder running adjustment		Service mode	Setting 1
EVF adjustment		Normal	Setting 1 (EVF disassembled) *2

*1 Under-voltage adjustment setting (Fig. II-25)

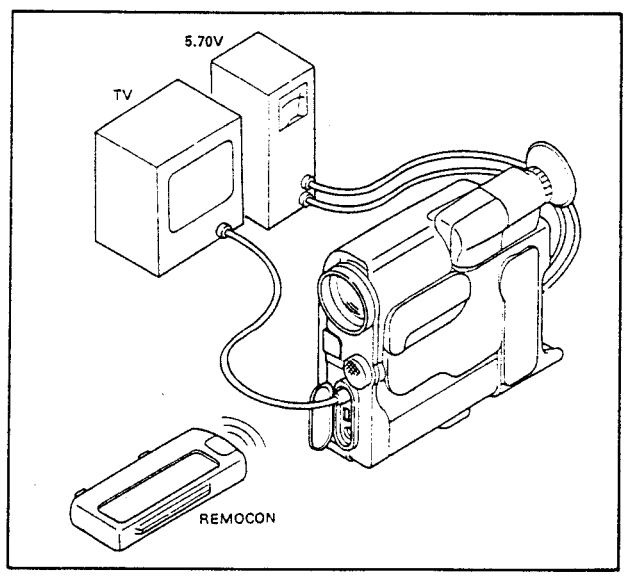


Fig. II-25

*2 EVF adjustment setting (Fig. II-26)

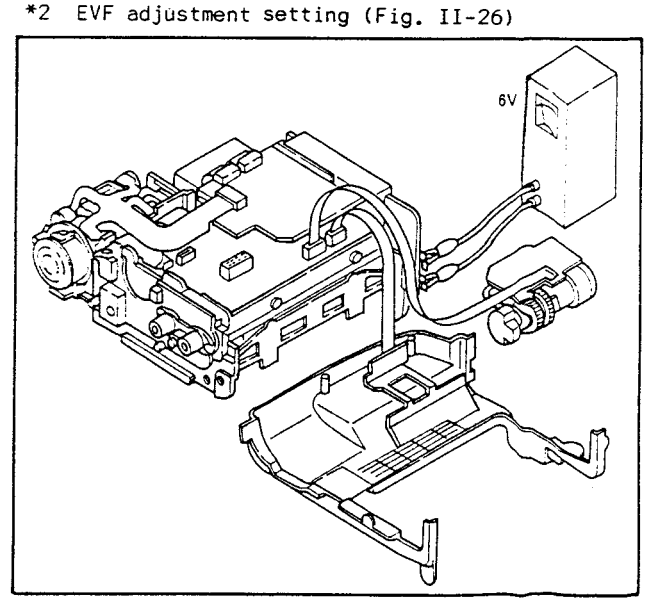


Fig. II-26

3-2 Setting

3-2-1 Setting 1 (Fig. II-27)

(1) Employed tools and instruments
- Constant voltage supply (6 V)
- Extension cable C

(2) Procedure
1) After disassembling the outer part, connect EVF and KEY-1 P.C.B.
2) Supply 6 V from the constant voltage supplier to the battery links.
3) When adjusting the microcomputer, connect it after disengaging the KEY-2 P.C.B. from the right cover.

(3) Purpose
At this status, carry out the electrical adjustment of camera, recorder microcomputer adjustment and run adjustment. (Stand the main unit when adjusting the camera.)

(4) Others
- To fetch a signal from the service connector of CN102, use the extension cable C.
- When a character display on the screen is unnecessary, do not connect the EVF.

3-2-2 Setting 2 (Fig. II-28)

(1) Employed tools and instruments
- Constant voltage suppliers 6 V (x2)
- Y/C separator
- Extension cable A
- Pattern generator

(2) Procedure
1) After disassembling the outer part, connect the KEY-1 P.C.B.
2) Disengage the C-MAIN P.C.B. (1 screw), and engage the extension cable A with CN410 (P.C.B. cutout toward pin 1).
3) Connect Y/C separator to the extension cable A. (Supply to Y/C separator the signal +6 V from the pattern generator.)
4) Supply 6 V from the constant voltage supply to the battery links.

(3) Purpose
At this status, adjust VR and VC of the recorder.

Note: Adjust the pattern generator output so that the Y signal inputted from Y/C separator to recorder will be 500 mVp-p.

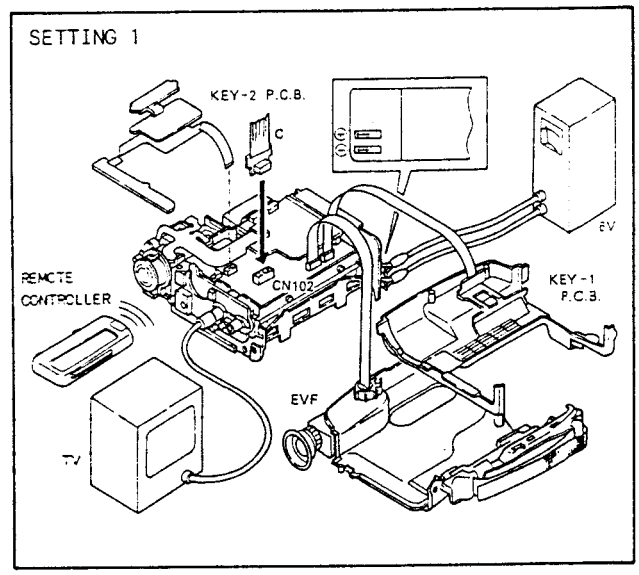


Fig. II-27

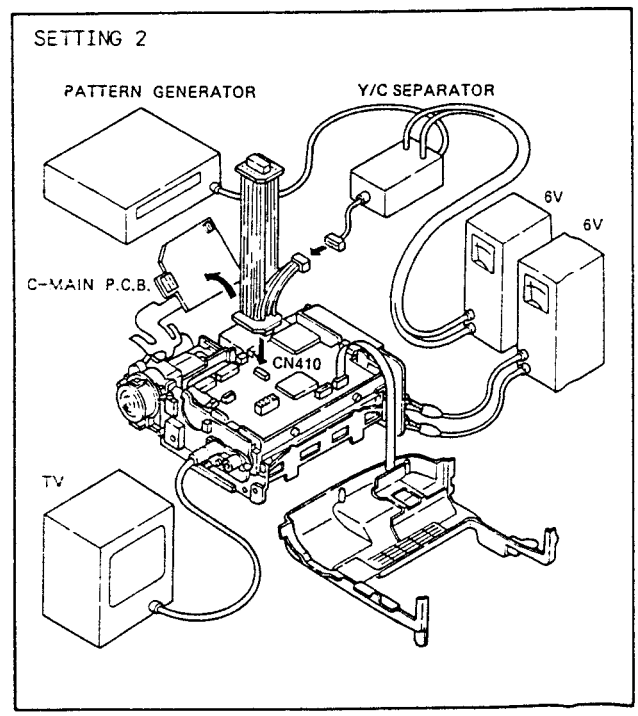


Fig. II-28

3-3 How to open P.C.B.s (Fig. II-29)

The disassembling procedures are omitted.
Refer to a corresponding section as required.

3-3-1 C-MAIN P.C.B.

(1) Disengage the C-MAIN P.C.B., and interconnect the C-MAIN P.C.B. and R-MAIN P.C.B. by the extension cables A and B.

Purpose:
At this status, check the backside of C-MAIN P.C.B.

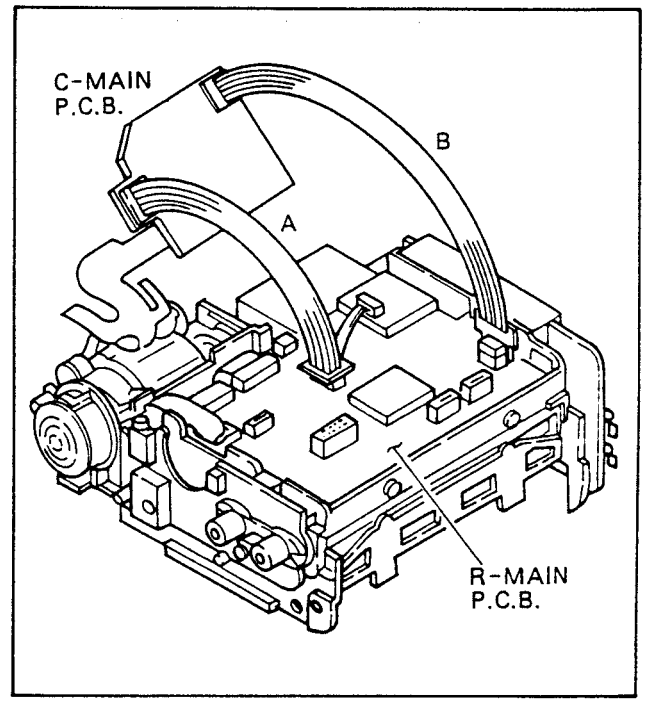


Fig. II-29

3-3-2 R-MAIN, JACK and POWER SUPPLY P.C.B.s (Fig. II-30)

(1) Remove the lens unit, C-MAIN P.C.B., SENSOR P.C.B., RECORDER P.C.B. holder (B) and lens holder.
(2) Disengage the POWER SUPPLY P.C.B. and JACK P.C.B.
(3) Disengage the connector between the R-MAIN P.C.B. and recorder mechanism section, and open the R-MAIN P.C.B. (After opening, reengage the connector.)
(4) Engage the POWER SUPPLY P.C.B. and JACK P.C.B.

Purpose:
At this status, check the backside of R-MAIN, JACK and POWER SUPPLY P.C.B..

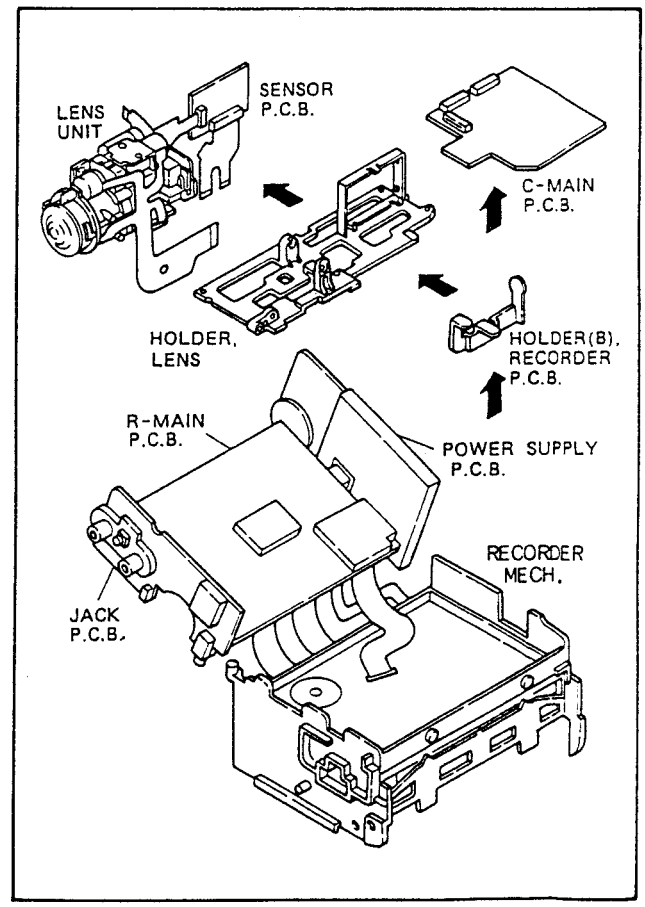


Fig. II-30

3-4 Service mode (microcomputer adjustment)

3-4-1 Outline of service mode

The instrument has six service modes, where the main unit is changed to a special mode or data in the microcomputer is displayed on EVF. (Monitor display is available by the on-screen button of remote controller.)

In this mode, microcomputer adjustment, run adjustment or different checks are performed.

For a mode transfer, push the unused SW of the remote controller. Every pressing the SW transfers the mode as follows.

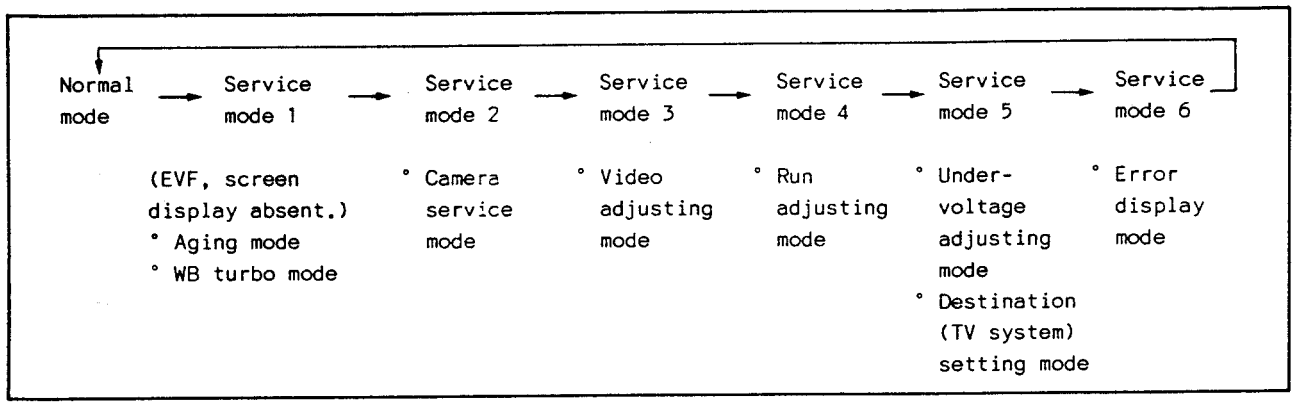


Fig. II-31

In a service mode except 2 and 3, detection of the following errors are overridden.

° Drum rotation error ° Capstan rotation error ° Reel rotation error

3-4-2 Transfer to service mode (Fig. II-32)

The service mode is activated by short-circuiting remote control patterns shown in Fig. II-32. (The WL-1 has patterns but it provids no holes on its exterior. Therefore, do not use it.)

The remote controller is available as a service part.

Example: WL-50 (DY2-1379-000)

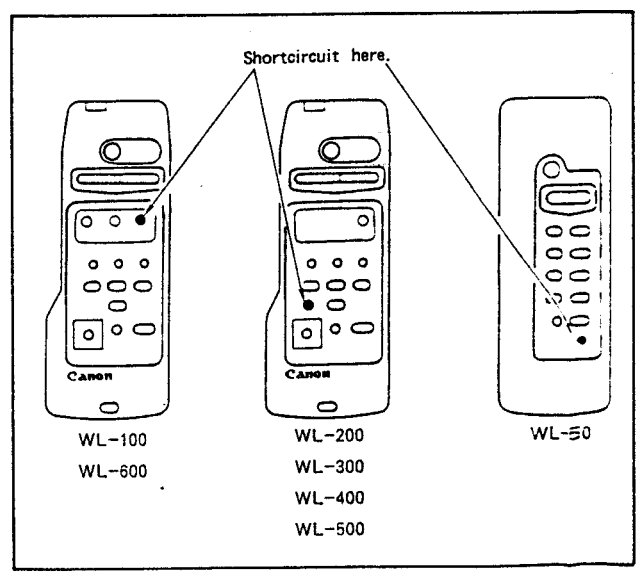


Fig. II-32

3-4-3 Explanation of service mode

(1) Service mode 1

Causes 2 status below (no display on EVF and monitor).

° Aging mode
Pressing (+) key on the main unit selects the PLAY mode without tape. Canceled by (-) key.

° WB turbo mode
Increases the control speed for auto white balance (AWB).

(2) Service mode 2 (Fig. II-33)

For camera microcomputer adjustment.

Different adjusting and fixed data in E²PROM of camera microcomptuer are displayed.

There are 192 data which are displayed in 48 different screens of 4 data each.

1) Data setting and adjusting method

For data setting and adjustment, use the main unit and remote controller keys as follows.

° PLAY (▶) : Basic address feed key

Every pressing advances the basic address.

→00 → 04 → 08 → 0C ..... BE → BF →

° (+)/(-): Data select keys

Move the arrow to select a data. (+) key moves the arrow from top down and (-) key vice versa.

° FF(▶▶)/REW(◀◀): Data setting keys

Set a data.
FF key changes the data toward the positive side and REW key toward the negative side.

° REC: Data write key

Pressing the key writes a current data into E PROM of camera micro-computer.
When writing is made properly, the data is followed by "G" (Good).
If "N" (NG) is displayed, check the wiring, etc.

(2) Addresses and items

Table II-4 gives basic addresses and names of adjusting data.

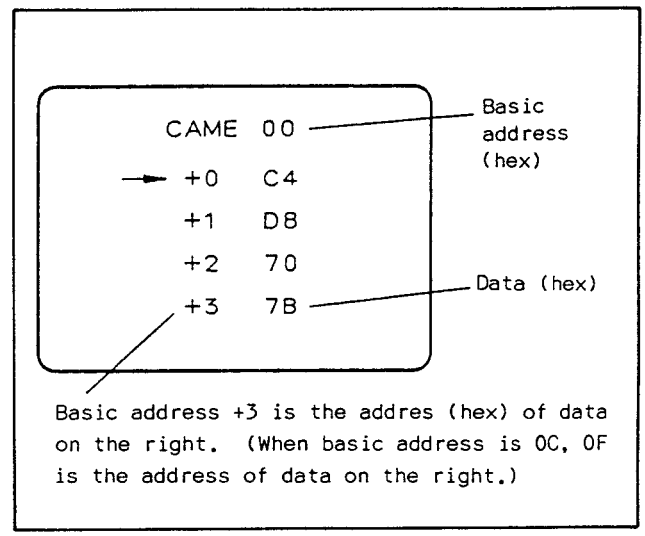

CAME 00
+0 C4
+1 D8
+2 70
+3 7B
Basic address (hex)
Data (hex)
Basic address +3 is the addres (hex) of data on the right. (When basic address is 0C, 0F is the address of data on the right.)

Fig. II-33

Table II-4

Basic address	Data name	Data
00	CCD reset adjustment	Adjustment
01	O.B. set adjustment	Adjsutment
02	Auto iris adjustment	Adjustment
03	Y AGC adjustment	Adjustment
04	1/2 fH color difference offset adjustment	Adjustmnet
05	Chroma offset adjustment	Adjustment
06	Color difference coincidence adjustment	Adjustment
07	Unused	
08	R-Y carrier balance adjustment	Adjustment
09	B-Y carrier balance adjustment	Adjustment
0A	Burst phase adjustment	Adjustment
0B	Burst level adjustment	Adjustment
0C	R-Y WB adjustment	Adjustment
0D	B-Y WB adjustment	Adjustment
0E	R-Y color gain adjustment	Adjustment
0F	B-Y color gain adjustment	Adjustment
10	R-Y AWB adjustment	Adjustment
11	B-Y AWB adjustment	Adjustment
12	Color difference signal average 1 adjustment	Adjustment
13	Color difference signal average 2 adjsutment	Adjustment
14	Iris encoder 1 adjustment	Adjustment
15	Iris encoder 2 adjustment	Adjustment
16	Iris encoder 3 adjustment	Adjustment
17	Iris encoder 4 adjustment	Adjsutment
18	AF B.P.F.	79
19	AGC maximum again	45
1A	AGC basic gain	70
1B	Knee point adjustment	Adjustment
1C	White clip adjustment	Adjustment

(3) Service mode 3 (Fig. II-34, Table II-5)

For video adjustment. A line input is automatically selected. Therefore, the data is displayed only on EVF.

The same as in the service mode 2, move the arrow by (+)/(-) keys, set a data by FF/REW keys and write a data by REC key.

A current data is displayed by the mode display LED as shown in Table II-5. Therefore, the adjustment is available without EVF.

- GCA: Y FM deviation adjustment
- CAR: Y FM carrier adjustment
- VG1: V REF adjustment

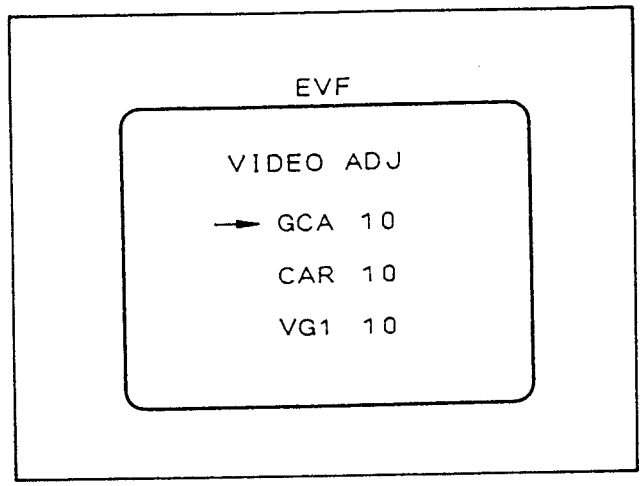


Fig. II-34

Table II-5

		Shooting LED	Viewing LED
Current data	GCA	●	●
	CAR	●	☼
	VG1	☼	☼

(4) Service mode 4 (Fig. II-35)

For run adjustment. The switching pulse duty ratio is changed and RF envelope is fully checked.

(+) key selects any of 3 statuses below (no screen display).

- 75% RF envelope output
- 100% RF envelope output
- Normal status

Note: (+) key serves as FF key in the viewing mode. Therefore, the above transfer is possible only after selecting the shooting mode. In the service mode 4, 75% RF envelope status is selected at all times.

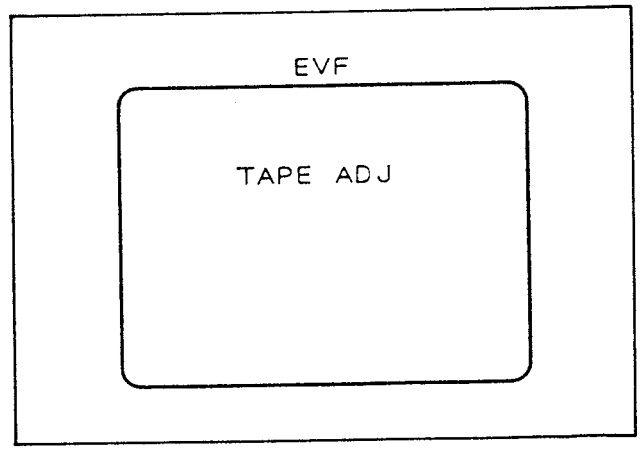


FIG. II-35

(5) Service mode 5 (Fig. II-36)

For under-voltage adjustment and destination (TV system) setting.

Operate (+)/(-) key to move the arrow. Operate REC key to change the currently reading voltage to an under-voltage data or change the destination.

- BAT: Under-voltage data
- WOR: Destination
  US = PAL
- MEM: Currently reading voltage

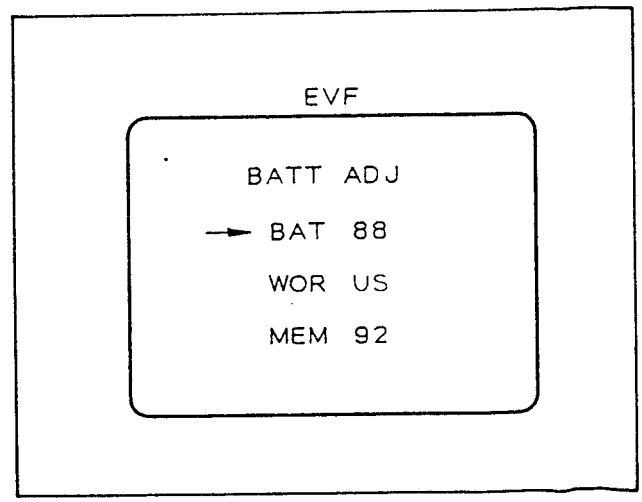


Fig. II-36

(6) Service mode 6 (Fig. II-37)

For error display.

° ERR: Left digit is an error code.
1 = loading error
2 = reel error
4 = capstan error
If errors occur simultaneously, the sum is displayed.

° ERR: Right digit is a data page.
DA1 and DA2 data change.
Operate (+)/(-) key to change the page.

° DA1 and 2: (not used)

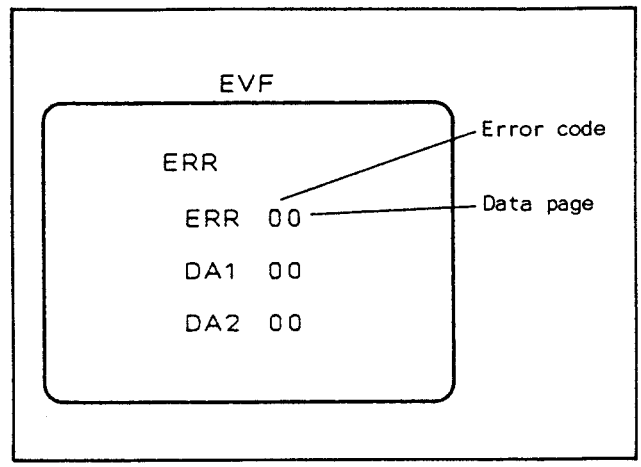


Fig. II-37

3-5 Employed charts (Figs. II-38, 39, 40)

(1) Fixture (furnished with A1 service manual)

Used for blooming adjustment. Mount the fixture on the lens front and install a filter.

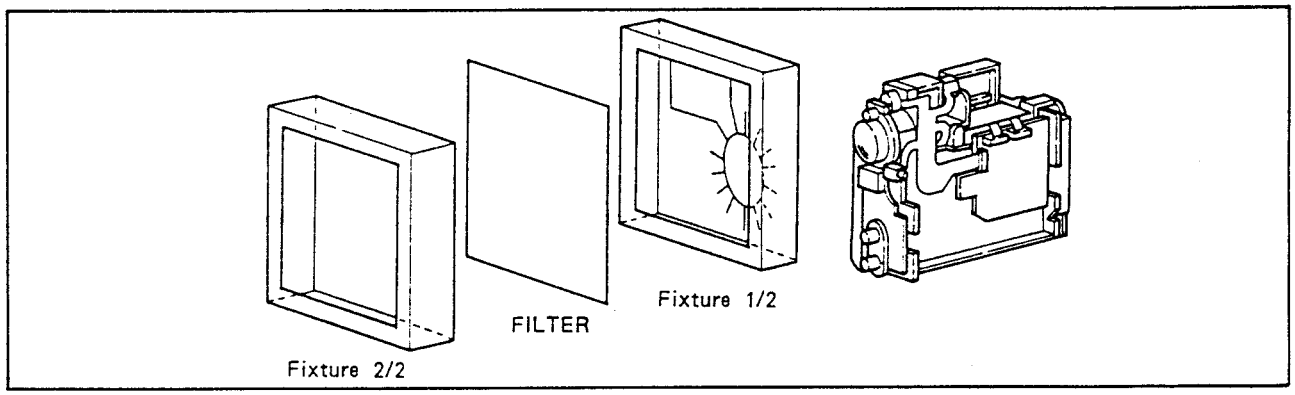


Fig. II-38

(2) U-pattern chart

1) Cut out the center of a black sheet as shown in Fig. II-39.

2) ⧖ marks shows standard angle of view.

Note: For a blooming adjustment, attach a white sheet on the backside.

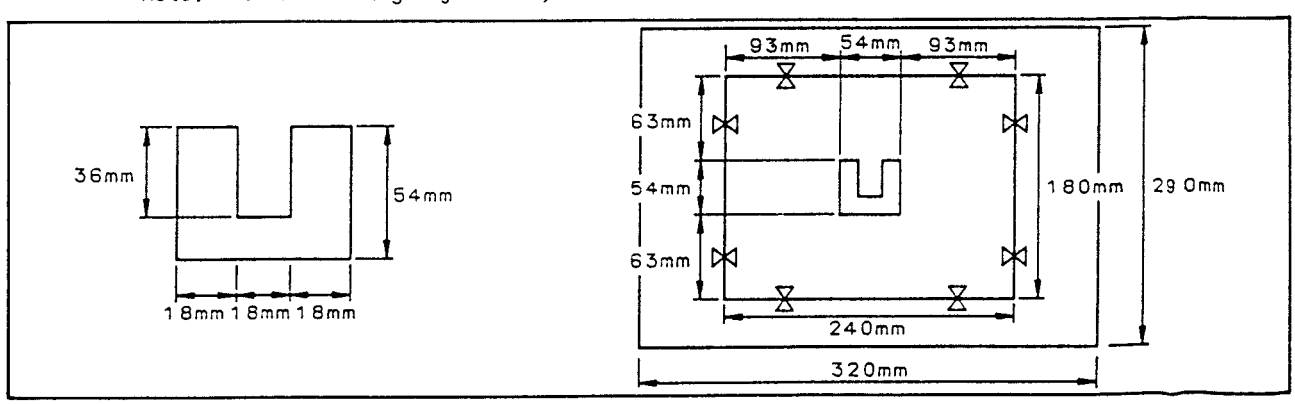


Fig. II-39

(3) 100% chart (Fig. II-40)

1) Attach two black sheets of 120 x 20 mm at positions in Fig. II-40 on a transparent glass pane (or direct on the gray scale).

2) Put this chart on the gray scale and carry out a knee point adjustment.

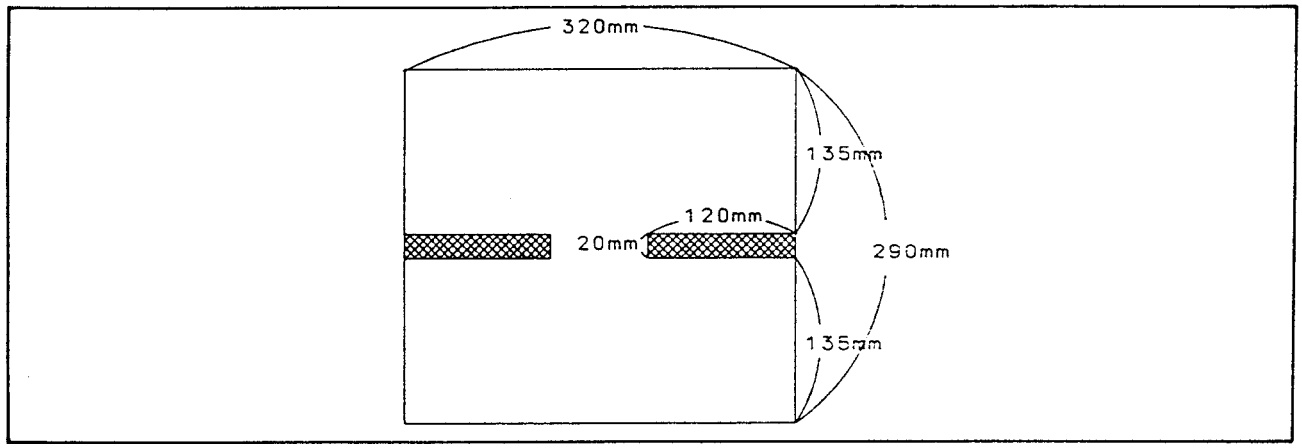


Fig. II-40

3-6 Other precautions (Fig. II-41)

(1) Warm up for at least 3 minutes before the adjustment.

(2) Use a light box at color temperature of 5600°K.

(3) Standard angle of view

° The standard angle of view is obtained when the chart is shot over the entire screen of full scan monitor.

° When checking on an oscilloscope, the gray scale section must be 36 µs or the color bar 52 µs.

° When shooting other charts, center them at a standard angle of field set by the gray scale and color bar.

° Unless otherwise specified, the shooting distance is approximately 1.4 m.

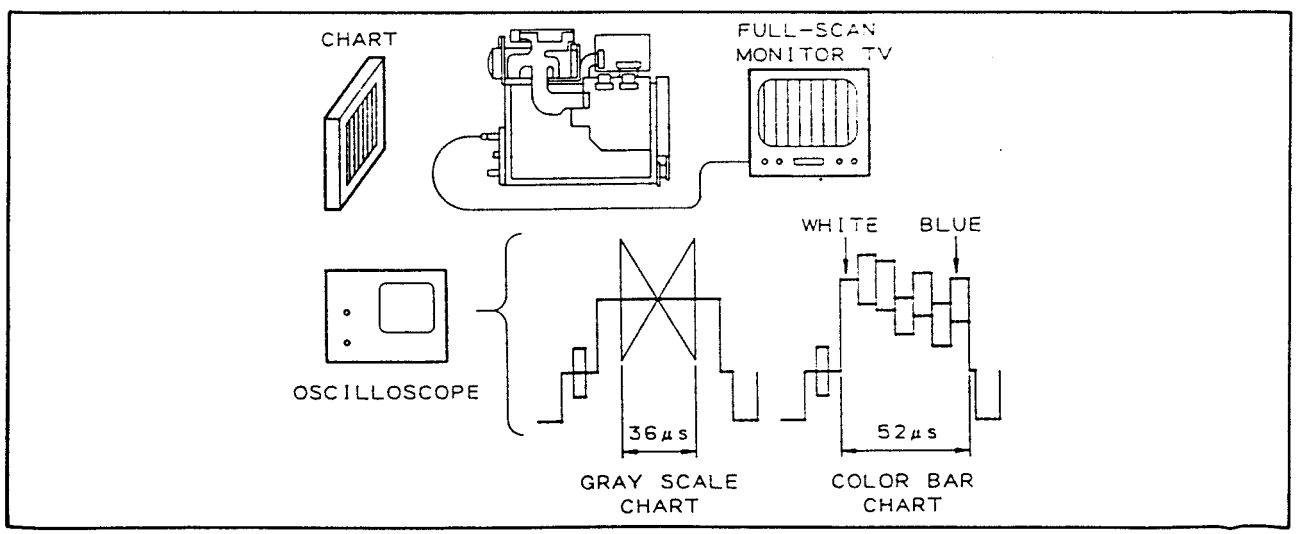


Fig. II-41

4. AF Electrical Adjustment

4-1 CZ adjustment (microcomputer adjustment)

Carry out this adjustment after removing the zoom encoder P.C.B. or reset P.C.B.

4-1-1 Preparation for CZ adjustment

CHART	Siemens chart 2.4 m ± 3 cm
M. EQ.	Monitor TV
TOOL	Character generator (DY9-1115-000)
ADJ.	Microcomputer adjustment by keying

Procedures:

(1) Connect the wires of character generators (DY9-1115-000) to TP shown in Fig. II-42 according to the colors.

(2) Mix the character output of character generator with video signal (use BNC branch connector or the like), and connect the altogether to the monitor.

(3) Connect TP1501 to +5 V (TP1102) and TP1506 to GND (TP1105).

(4) Place the Siemens chart at 2.4 m ± 3 cm from the lens front. (Fig. II-43)

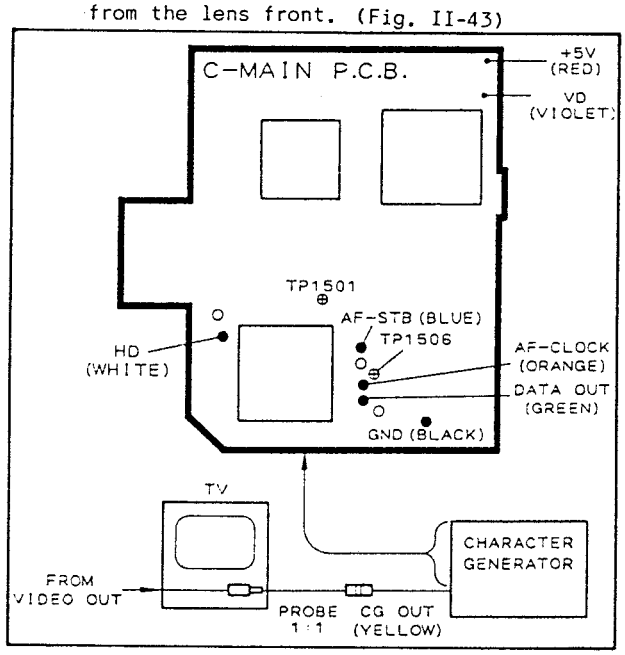


Fig. II-42

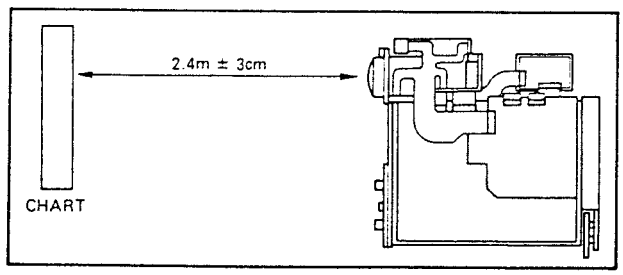


Fig. II-43

4-1-2 CZ adjustment

(1) Turn on power, wait for approximately 5 seconds after a picture has appeared, and then press the auto focus ON/OFF button.

(2) Operate the power focus (F/N) button to raise or lower the display of basic stroke (3 digits from left of character generator) to match the value written in the zoom encoder (Fig. II-44).

(3) Push the auto focus ON/OFF button.

(4) When the zoom lens has stopped on the wide side, operate the power focus (F/N) button to set the focus.

(5) Push the auto focus ON/OFF button.

(6) When the focus lens has stopped after moving for a specified amount, press the television button to move the zoom lens to the television side.

(7) During this while, the focus is set at 2 points. By the television/wide button, stop the zoom lens at the second focused point using the functions below.

1) Pressing, releasing and pressing again the television button lowers the zoom speed. (Decelerate immediately before the second focal point and set the focus.)

2) If the second focal point is past, press the wide button to return the zoom lens. (The zoom speed in the wide direction is high only.)

3) If the television button is released too early in 1), pressing the wide button to return the zoom lens to the position where the television button is released in 1) increases the zoom speed again.

4) The zoom position, focus position and zoom speed are displayed on the character generator. Refer to them (Fig. II-44).

(8) Press the auto focus ON/OFF button.

(9) The zoom lens moves by a specified amount and the focus lens moves by a specified amount making a go-return movement. If a focal point is within the range of the go-return movement, press the power focus FAR button to go to (10) or, otherwise, recommence from the beginning.

(10) In 2 to 3 seconds, the focus moves and returns to the initial position. Thereafter, the character generator display returns to a normal one. Upon making sure of it, turn off power.

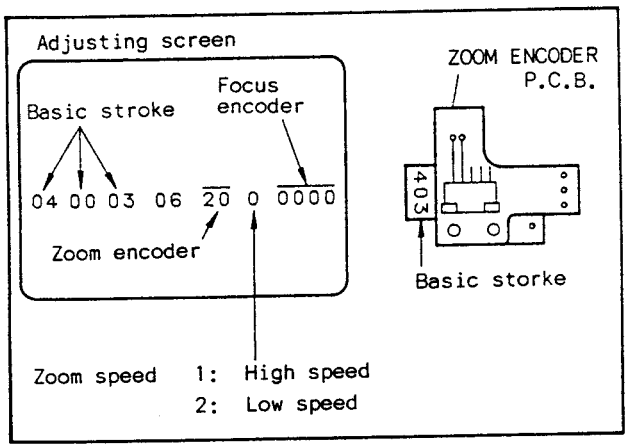


Fig. II-44

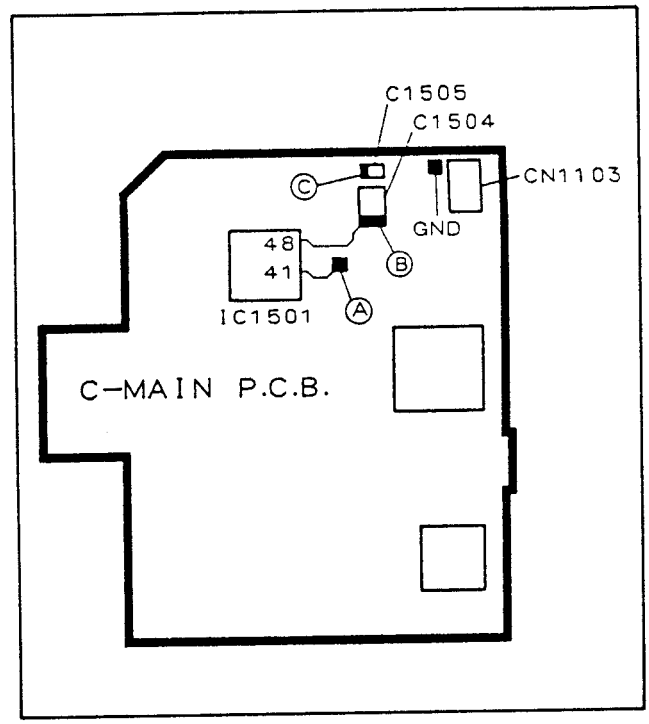


Fig. II-45

4-2 ES offset adjustment

CHART	LENS CLOSE
MODE	AF
M. EQ.	Digital voltmeter
TP/TRIG.	C-MAIN P.C.B. IC1501 pin 41 (OFFSET) pin 48 (1.8 V)
ADJ.	C-MAIN P.C.B. VR1501 (OFFSET)
SPEC.	0 ± 10 mV

Procedure:

(1) Open the C-MAIN P.C.B. and connect leads to Ⓐ (IC1501 pin 41) and Ⓑ (IC1501 pin 48).

(2) Connect Ⓒ and GND. (Cut AF-YH signal.)

(3) Mount the C-MAIN P.C.B., turn on power and, by the leads connected in (1), meausre the difference in potential between Ⓐ and Ⓑ.

(4) Adjust VR1501 so the difference in potential between Ⓐ and Ⓑ will be 0 ± 10 mV.

5. Electrical Adjustments of Camera

Note: Retain the service mode 2 for adjustments 5-4 to 5-21. Refer to 3-4 Service mode (p. II-12).
After setting data, write it without fail.

5-1 Clock frequency adjustment

M. EQ.	Frequency counter Note: Connect it via oscilloscope.
TP/TRIG.	C-MAIN P.C.B. TP1104 (CSP2)
ADJ.	SENSOR P.C.B. VC1001 (CLOCK)
SPEC.	4.828125 MHz ± 15 Hz

5-2 PLL adjustment

M. EQ.	Digital voltmeter
TP/TRIG.	C-MAIN P.C.B. TP1101 (PLL)
ADJ.	SENSOR P.C.B. VC1002 (PLL)
SPEC.	2.5 ± 0.2 V

5-3 DM-PLL adjustment

M. EQ.	Digital voltmeter
TP/TRIG.	C-MAIN P.C.B. TP1401 (DM-PLL)
ADJ.	C-MAIN P.C.B. VC1401 (DM-PLL)
SPEC.	2.5 ± 02. V

5-4 CCD RESET adjustment

CHART	Grayscale (5600°K)
MODE	Service mode 2
M. EQ.	Oscilloscope
TP/TRIG.	C-MAIN P.C.B. TP1103 (YS) /TP1106 (FH/2)
ADJ.	00 (data address)
SPEC.	Maximize waveform at TP1103 (YS). If waveform does not change, set the data to C4.

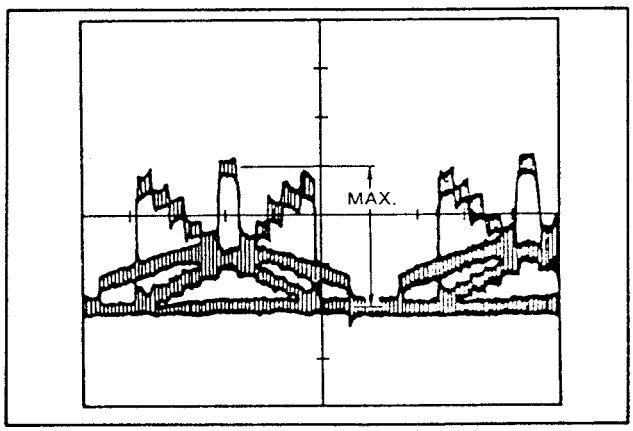


Fig. II-46 10 mV/10 µS

5-5 OB set adjustment

CHART	Lens capped
MODE	Service mode 2
M. EQ.	Oscilloscope
TP/TRIG.	C-MAIN P.C.B. TP1108 (YH) /TP1106 (FH/2)
ADJ.	01 (data address)
SPEC.	Set the waveform center and blanking center to the same level. (0 ± 10 mV)

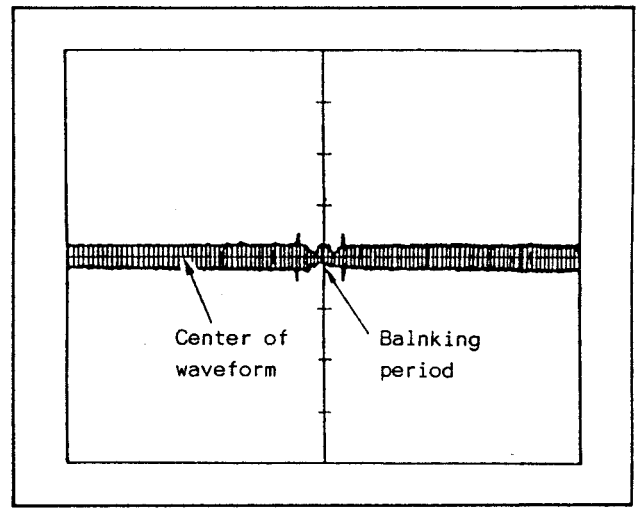


Fig. II-47 5 mV/10 µS

5-6 Auto iris adjustment

CHART	Grayscale (5600°K)
MODE	Service mode 2
M. EQ.	Oscilloscope
TP/TRIG.	C-MAIN P.C.B. TP1103 (YS) /TP1106 (FH/2)
ADJ.	02 (data address)
SPEC.	300 ± 10 mV

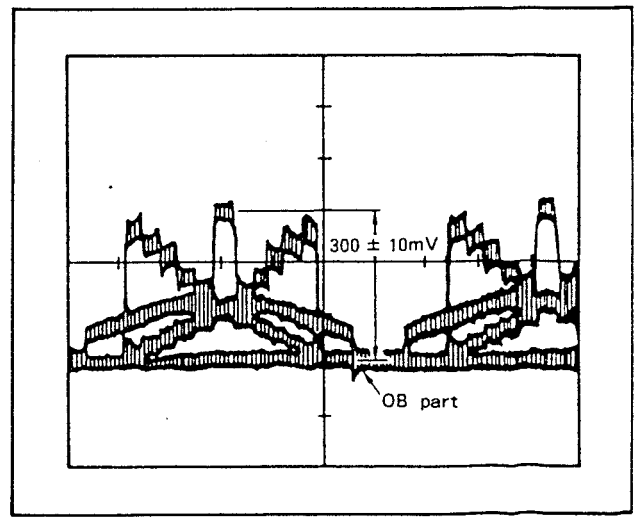


Fig. II-48 10 mV/10 µS

5-7 Y AGC adjustment

CHART	Grayscale (5600°K)
MODE	Service mode 2
M. EQ.	Oscilloscope
TP/TRIG.	C-MAIN C.B.A. TP1107 (Y) /TP1106 (FH/2)
ADJ.	03 (data address)
SPEC.	330 ± 10 mV

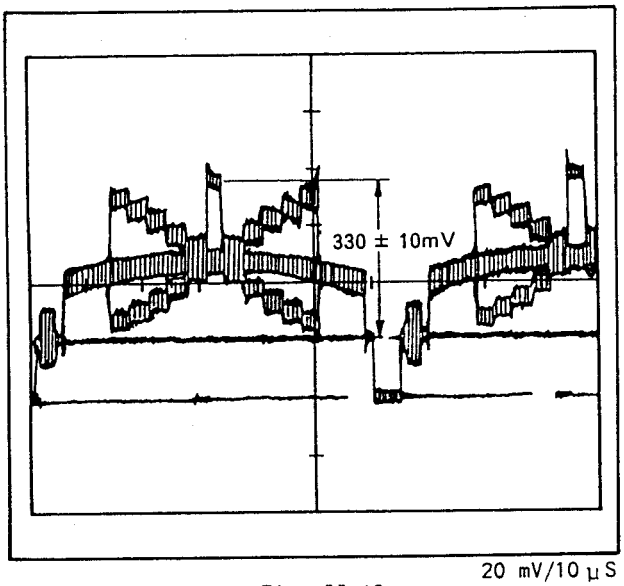


Fig. II-49

5-8 1/2 fH color difference offset adjustment

CHART	Lens capped
MODE	Service mode 2
M. EQ.	Oscilloscope
TP/TRIG.	C-MAIN P.C.B. TP1109 (C0H) /TP1106 (FH/2)
ADJ.	04 (data address)
SPEC.	0 ± 10 mV

Adjust as specified the offset of video signal every cycle.

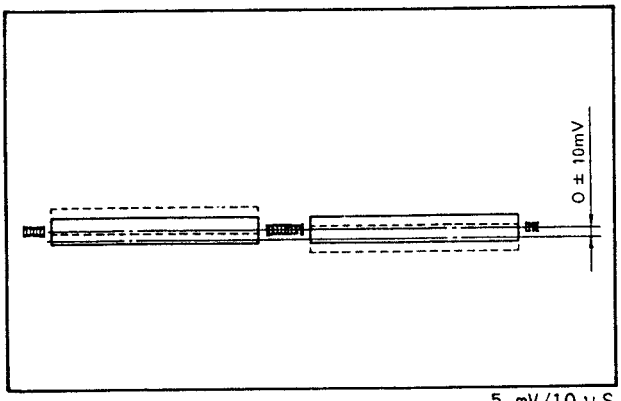


Fig. II-50

5-9 Chroma offset adjustment

CHART	Lens capped
MODE	Service mode 2
M. EQ.	Oscilloscope
TP/TRIG.	C-MAIN P.C.B. TP1109 (C0H) /TP1106 (FH/2)
ADJ.	05 (data address)
SPEC.	0 ± 10 mV

Adjust as specified the offset between blanking section and video period.

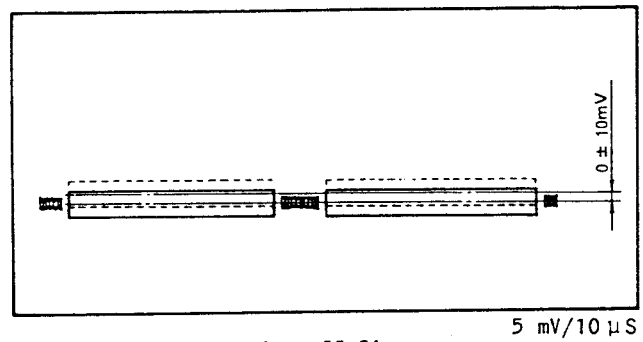


Fig. II-51

5-10 Color difference coincidence adjustment

CHART	Color bar (5600°K)
MODE	Service mode 2
M. EQ.	Vectorscope
TP/TRIG.	VIDEO OUT
ADJ.	06 (data address)
SPEC.	Align each bright dot. Tolerance of dot split: phase 5°,

For measuring method, refer to Fig. II-52.

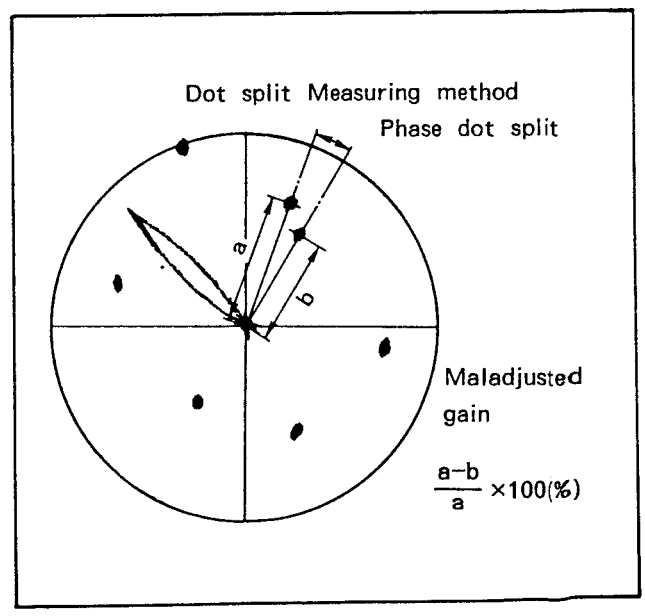


Fig. II-52

5-11 Carrier balance adjustment

CHART	Grayscale (5600°K) See Fig. II-53.
MODE	Service mode 2
M. EQ.	Vectorscope
TP/TRIG.	VIDEO OUT
ADJ.	08, 09 (data address)
SPEC.	Bring bright dot (dark section) to center.

Notes: 1. For adjustment, rotate the zoom from the standard angle of view toward wide until the angle of view is as illustrated below.
2. If there appear 2 bright dots. retain the one in the surrounding dark section.

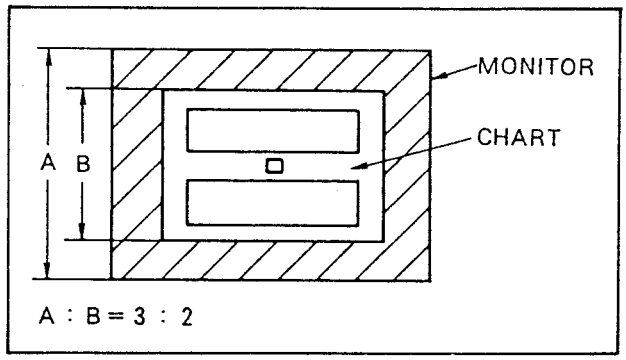


Fig. II-53

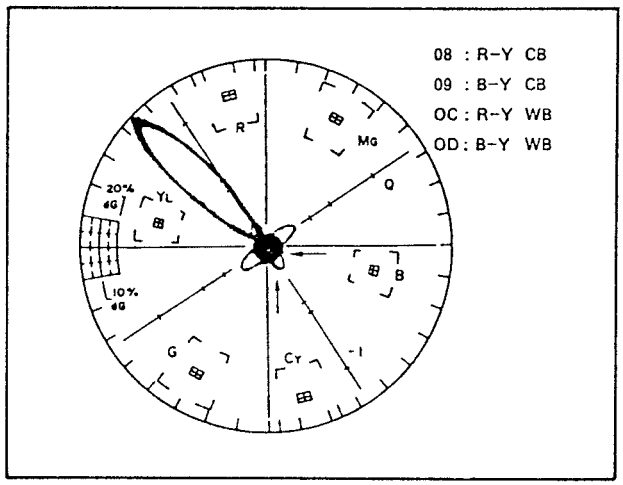


Fig. II-54

5-12 Burst phase adjustment

CHART	Color bar (5600°K)
MODE	Service mode 2
M. EQ.	Vectorscope
TP/TRIG.	VIDEO OUT
ADJ.	0A (data address)
SPEC.	135 ± 2°

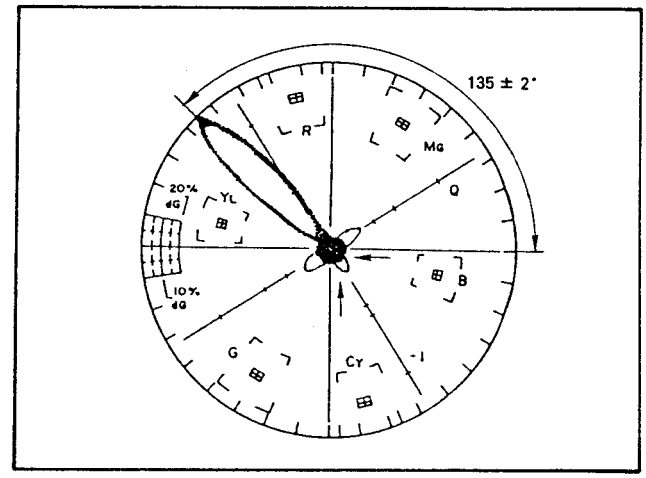


Fig. II-55-1

5-13 Burst level adjustment

CHART	Color bar (5600°K)
MODE	Service mode 2
M. EQ.	Oscilloscope
TP/TRIG.	C-MAIN P.C.B. TP1112 (C) /TP1106 (FH/2)
ADJ.	0B (data address)
SPEC.	150 ± 10 mV

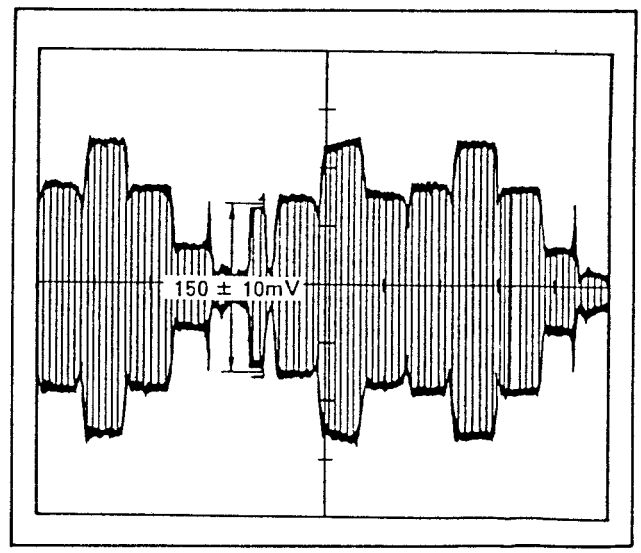


Fig. II-55-2

5-14 White balance adjustment

CHART	Light box (5600°K)
MODE	Service mode 2
M. EQ.	Vectorscope
TP/TRIG.	VIDEO OUT
ADJ.	0C, 0D (data address)
SPEC.	Bring bright dot to center. (Fig. II-54)

5-15 Color balance adjustment

CHART	Color bar (5600°K)
MODE	Service mode 2
M. EQ.	Vectorscope
TP/TRIG.	VIDEO OUT
ADJ.	OE, OF (data address)
SPEC.	Phase / Gain R 107 ± 2° / 1.7 ± 0.1 times Ye 168 ± 4° / 1.0 ± 0.1 times

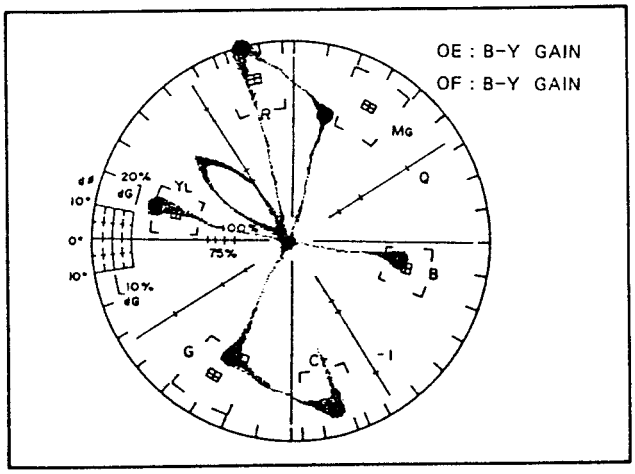


Fig. II-56

° Color balance check:
For check in the normal mode (complite product status), conform to the following specifications.

	Phase	Gain
R	107 ± 6°	1.7 ± 0.2 times
Ye	168 ± 8°	1.0 ± 0.25 times

Note: Carry out WB lock by a light box of 5600°K before shooting a color bar (5600°K).

5-16 FAWB adjustment

CHART	Light box (5600°K) + CCA12
MODE	Service mode 2
M. EQ.	Vectorscope
TOOL	CCA12 filter (DY9-2046-000)
TP/TRIG.	VIDEO OUT
ADJ.	10, 11 (data address)
SPEC.	Bring bright dot to center

Procedures:
(1) Mount CCA12 filter and shoot the light box of 5600°K.
(2) Vary the data of addresses 10 and 11 to bring the bright point to the center.

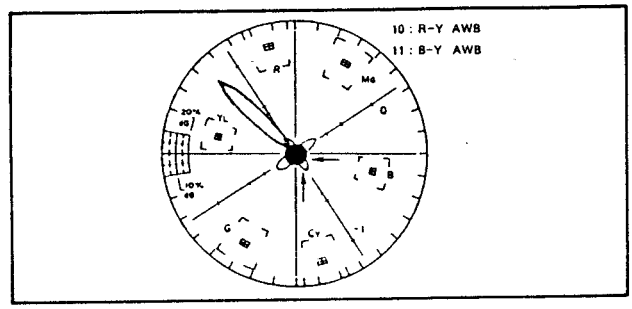


Fig. II-57

° FAWB check:
For check in the normal mode (product status), conform to the following specifications.
Mount CCA12 filter and shoot a light box of 5600°K. On the vectorscope, a bright dot must exist in the hatched area in Fig. II-58 on the vectorscope.
(Burst: On periphery. 40 mm long.)

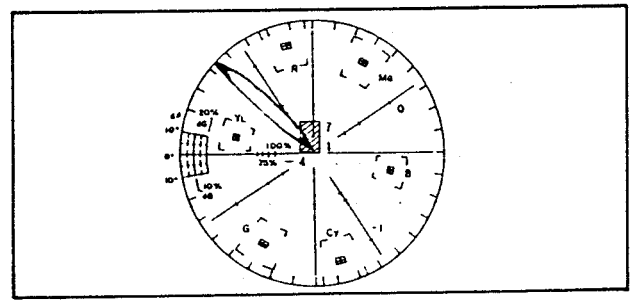


Fig. II-58

5-17 Color difference signal level fetch (low color temperature) adjustment

CHART	Light box (5600°K) + CCA12
MODE	Service mode 2
TOOL	CCA12 filter (DY9-2046-000)
ADJ.	12 (data address)

Procedure:
(1) Mount CCA12 filter and shoot the light box of 5600°K.
(2) Select a data address 12.
(3) Press REC key to fetch a color difference signal level.

5-18 Color difference signal level fetch (high color temperature) adjustment

CHART	Light box (5600°K)
MODE	Service mode 2
ADJ.	13 (data address)

Procedure:
(1) Shoot a light box of 5600°K.
(2) Select a data address 13.
(3) Press REC key to fetch the color difference signal level.

5-19 IRIS encoder adjustment

MODE	Service mode 2
ADJ.	14, 15, 16, 17 (data address)

Procedure:

(1) Connect +5 V to TP1113 (IRIS O/C) to open the iris.
(2) Select a data address 14 and press REC key.
(3) Connect +1.2 V to TP1113 to close the iris. (Use the constant voltage supply.)
(4) Select a data address 15 and press REC key.
(5) Select a data address 16 and press REC key.
(6) Connect +5 V to TP1113 and open the iris.
(7) Select a data address 17 and press REC key.
(8) If "N" has appeared, recommence from step (1).

Notes: ° Before pressing REC key, wait for at least 5 seconds if the iris is changed over from open to close or vice versa.
° Be sure to adjust in the sequence given above.

5-20 Knee point adjustment

CHART	100% chart + grayscale (5600°K)
MODE	Service mode 2
M. EQ.	Oscilloscope
TP/TRIG.	C-MAIN P.C.B. TP1107 (Y) /TP1106 (FH/2)
ADJ.	1B (data address)
SPEC.	335 ± 5 mV

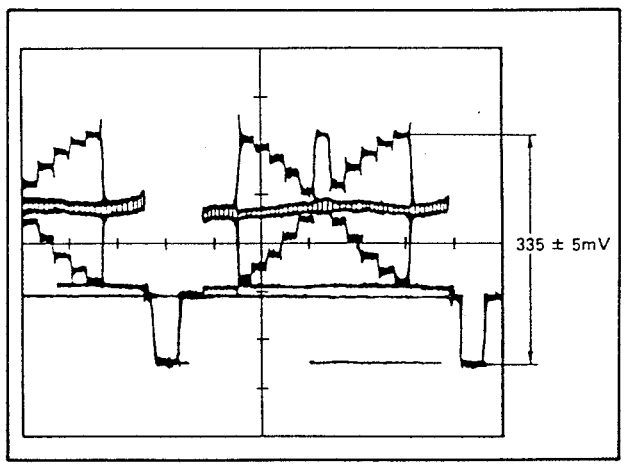


Fig. II-59

10 mV/10 µS

5-21 White clip adjustment

CHART	Window chart
MODE	Service mode 2
M. EQ.	Oscilloscope
TP/TRIG.	C-MAIN P.C.B. TP1107 (Y) /TP1106 (FH/2)
ADJ.	1C (data address)
SPEC.	410 ± 10 mV

Note: After a white clip adjustment, write a white level value according to 5-20.

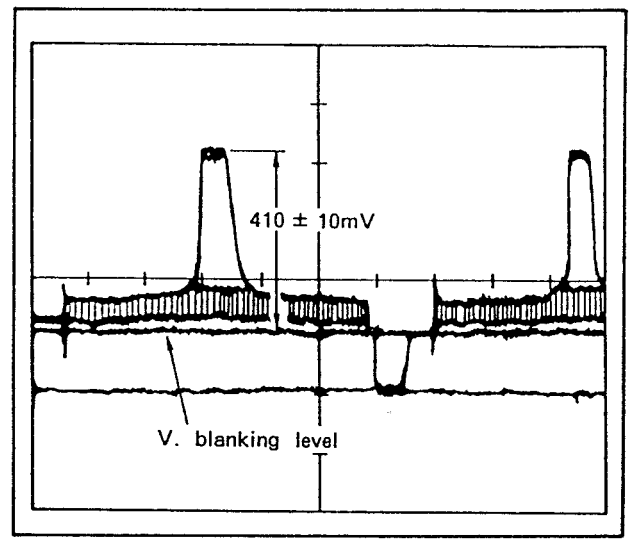


Fig. II-60

5-22 White level value writing adjustment

Note: Be sure to carry out this adjustment after performing the white balance adjustment (5-14) through the color balance adjustment (5-18).

MODE	Service mode 2
ADJ.	88, 89, 8A, 8B (data address)

Details of data:

° Data at addresses 88 and 89 are data of white level value 1 (88 for high order and 89 for low order).
° Data at addresses 8A and 8B are data of white level value 2 (8A for high order and 8B for low order).

Procedure:

(1) Add "0040H" (hexadecimal notation) to white level values 1 and 2 when writing.

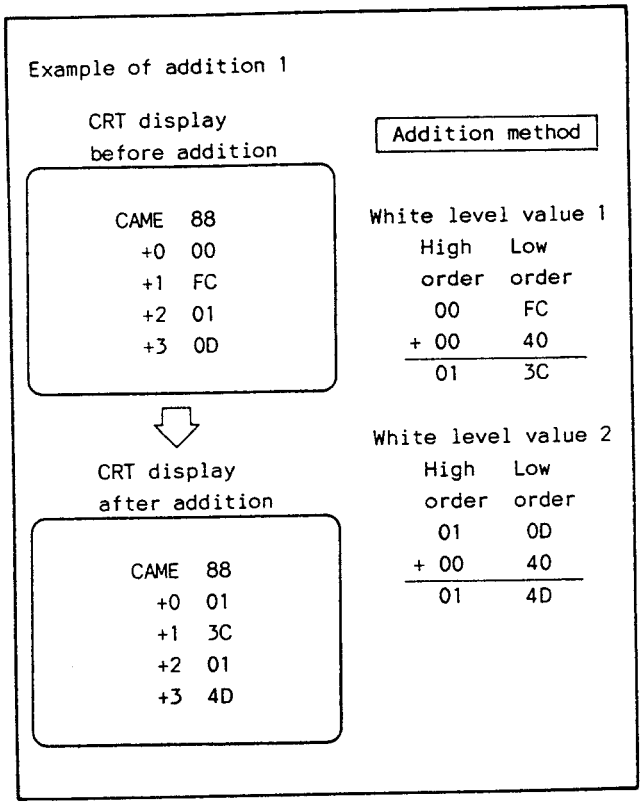


Fig. II-61

5-23 Blooming adjustment

CHART	U-pattern chart (with white paper)
MODE	Iris opened Interconnect TP1113 (IRIS O/C) and TP1102 (+5 V).
M. EQ.	Oscilloscope
TOOL	ND-2.0 (DY9-2044-000) Halogen lamp, white paper (thin one), fixture (furnished)
TP/TRIG.	C-MAIN P.C.B. TP1103 (YS) /TP1106 (FH/2)
ADJ.	SENSOR P.C.B. VR1001 (V SUB)
SPEC.	Blooming must be suppressed.

Notes: 1. Carry out this adjustment only after the CCD is replaced. Before replacing the SENSOR P.C.B., measure the voltage at CCD pin 10 (V SUB). Adjsut VR1001 so the voltage will be the same after mounting a new P.C.B.

2. If 300 mV cannot be obtained in step (6), reduce the thickness of white paper attached on the back-side of U-pattern chart.

Procedure:

(1) Open the iris (TP1113 ⟷ TP1102).
(2) Using the fixture (A1 service manual), mount ND-2.0 on the lens front.
(3) Prepare U-pattern chart with white paper attached on its backside.
(4) Make setting as shown in Fig. II-62.
(5) Shoot the U-pattern chart with the standard angle of view.
(6) Locate the halogen light so the signal level at TP1103 will be 300 mV. Also adjust the halogen light angle so the waveform will be as shown in Fig. II-63.
(7) At this status, remove ND-2.0 and observe the monitor TV (Fig. II-64).
(8) Turn the VR1001 counterclockwise, and wait until the blooming is suppressed. (approx. 10 seconds or more)

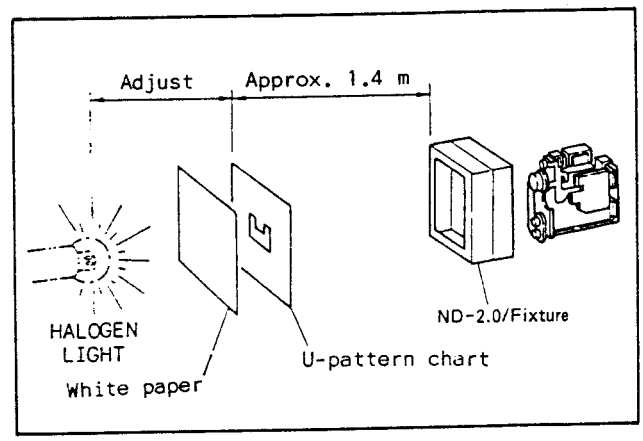


Fig. II-62

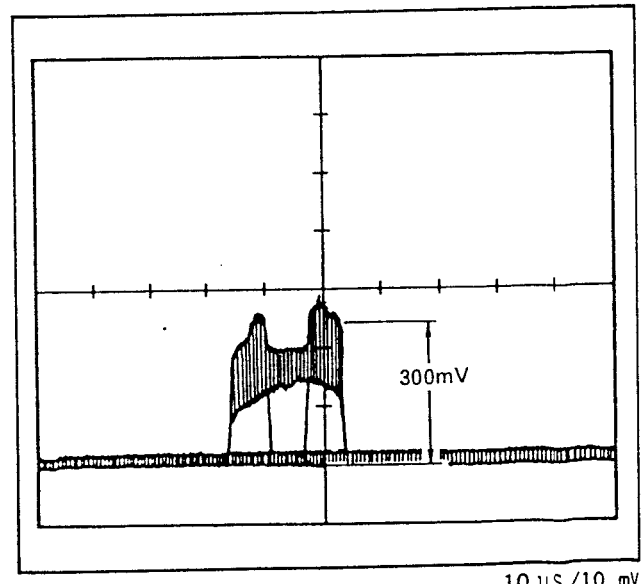


Fig. II-63

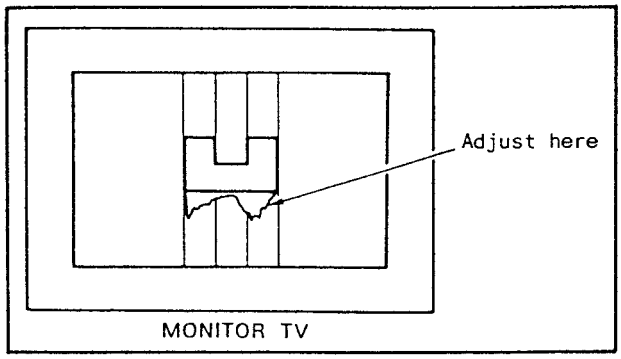
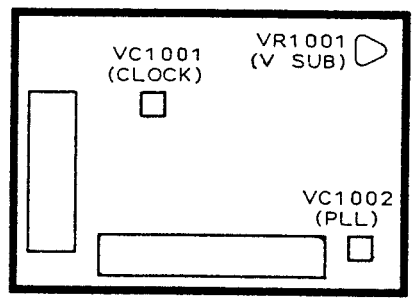


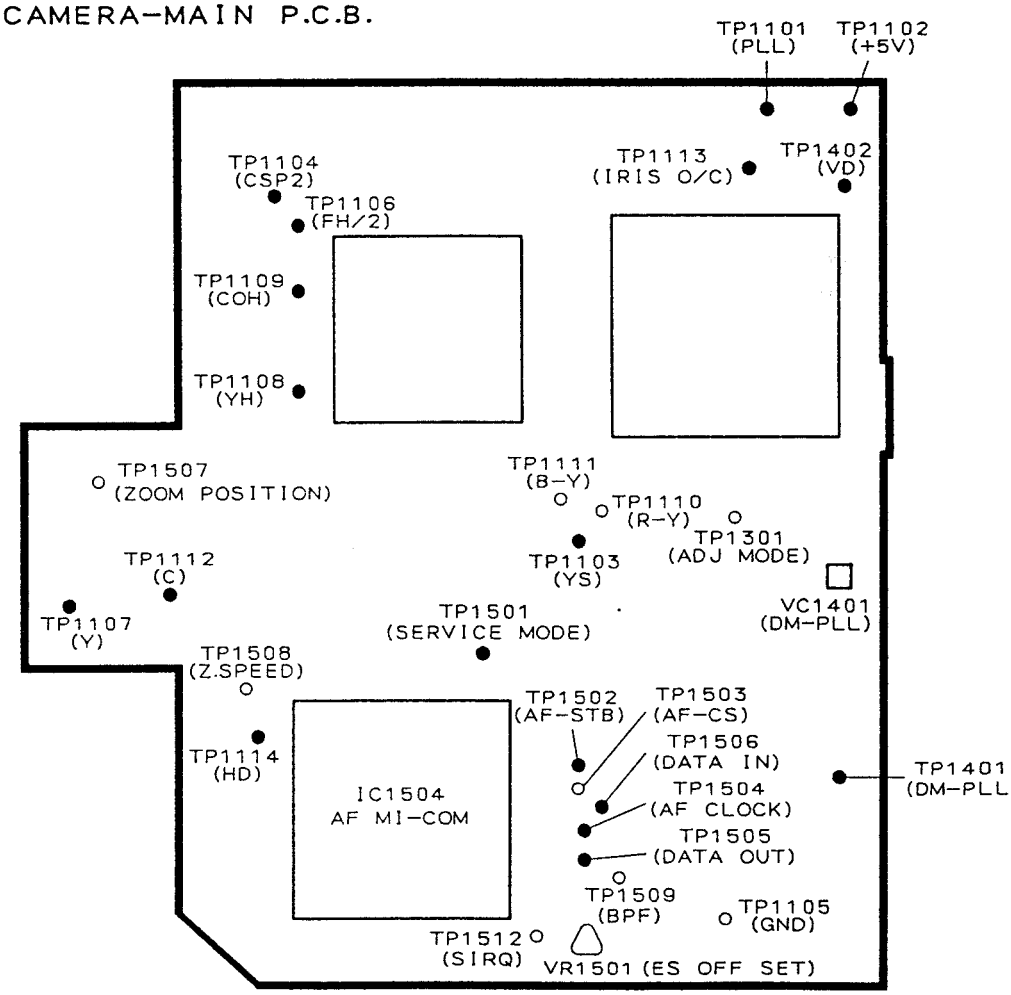
Fig. II-64

TP/VR and VC list

SENSOR P.C.B.



CAMERA-MAIN P.C.B.



6. Electrical Adjustment for Recorder

Notes: 1. Data adjusted in 6-1 and 6-2 are stored in E^2PROM of the camera microcomputer (IC 1303) on C-MAIN P.C.B.
After replacing C-MAIN P.C.B. or camera microcomputer, this adjustment is necessary.
2. When inputting a signal from Y/C separator, adjust the pattern generator VR so Y signal inputted to the recorder will be 500 mVp-p.

6-1 Destination setting adjustment

MODE	Service mode 5
ADJ.	WOR
SPEC.	US = PAL

Procedures:
(1) Select the service mode 5.
(2) Press REC key to set a destination.

6-2 Undercut adjustment

MODE	Service mode 5
M. EQ.	Digital voltmeter
ADJ.	BAT
SPEC.	5.70 ± 0.05 V

Procedures:
(1) Select the service mode 5.
(2) Set to 5.70 ± 0.05 V the voltage applied to the battery terminal.
(3) Press REC key and read a current voltage data as an under-voltage data.

6-3 Switching frequency (power supply) adjustment

M. EQ.	Frequency counter. Note: Measure via oscilloscope.
TP/TRIG.	POWER SUPPLY P.C.B. Q704 pin 4 (collector)
ADJ.	POWER SUPPLY P.C.B. VR703 (SWITCHING f)
SPEC.	470 ± 5 kHz

6-4 VTR 5V (AV, SS, EVF) adjustment

MODE	PB
M. EQ.	Digital voltmeter
TP/TRIG.	POWER SUPPLY P.C.B. TP ⓐ (AV 5V)
ADJ.	POWER SUPPLY P.C.B. VR702 (VTR 5V)
SPEC.	5.0 ± 0.05 V

6-5 CAMERA 5V adjustment

MODE	EE
M. EQ.	Digital voltmeter
TP/TRIG.	POWER SUPPLY P.C.B. TP ⓑ (CAMERA 5V)
ADJ.	POWER SUPPLY P.C.B. VR704 (CAMERA 5V)
SPEC.	4.9 ± 0.05 V

Note: Adjust the VR704 with the C-MAIN P.C.B. attached.

6-6 +18V adjustment

MODE	EE
M. EQ.	Digital voltmeter
TP/TRIG.	POWER SUPPLY P.C.B. TP ⓒ (+18V)
ADJ.	POWER SUPPLY P.C.B. VR701 (+18V, -8V)
SPEC.	18 ± 0.2 V

6-7 Switching point adjustment

SIGNAL	Monosco master (DY9-1062-000)
MODE	PB
TP/TRIG.	R-MAIN P.C.B. CN102 pin 14 (HSW) VIDEO OUT
ADJ.	R-MAIN P.C.B. VR403 (PG DL)
SPEC.	7.0 ± 1 H

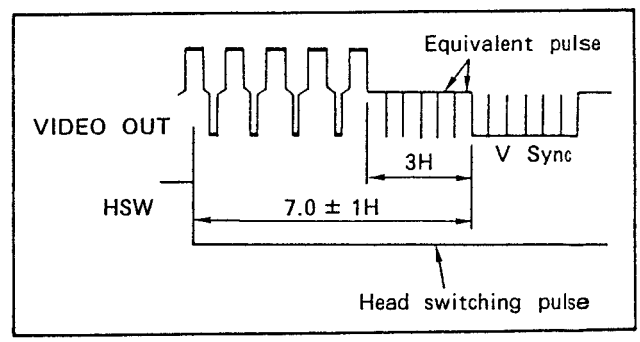


Fig. II-65

6-8 Capstan FG offset adjustment

SIGNAL	Color bar
MODE	REC
TP/TRIG.	R-MAIN P.C.B. CN102 pin 24 (C-FG)
ADJ.	R-MAIN P.C.B. VR404 (C-FG OFFSET)
SPEC.	Duty 50 ± 5%

Adjust VR404 so C-FG output waveform duty will be 50%.

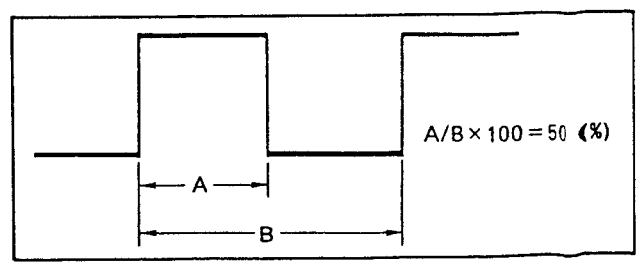


Fig. II-66

6-9 V REF adjustment

MODE	Service mode 3 (LINE IN). Setting 1.
M. EQ.	Digital voltmeter
TP/TRIG.	R-MAIN P.C.B. CN102 pin 19 (V REF)
ADJ.	VG1
SPEC.	2.1 ± 0.01 V

6-10 Y FM carrier adjustment

SIGNAL	Black signal (on raster, cut R, G and B)
MODE	Service mode 3 (LINE IN). Setting 1.
M. EQ.	Oscilloscope
TP/TRIG.	R-MAIN P.C.B. CN102 pin 5 (REC Y FM)
ADJ.	CAR
SPEC.	0.24 µsec/1 cycle (4.2 MHz)

Note: Use a signal waveform having a longer cycle.

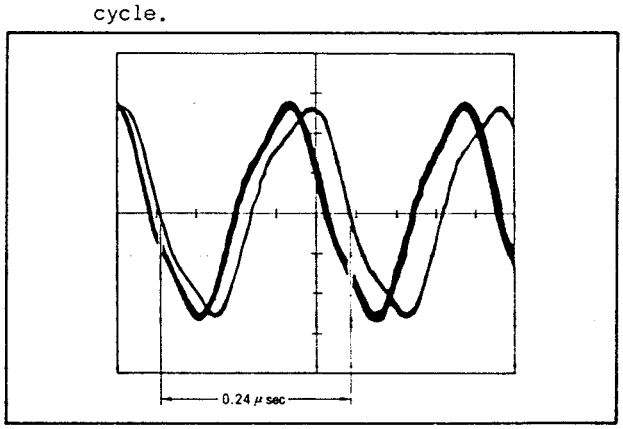


Fig. II-67 5 mV/50 ns

6-11 Y FM deviation adjustment

SIGNAL	100% white video signal
MODE	Service mode 3 (LINE IN). Setting 1.
M. EQ.	Oscilloscope
TP/TRIG.	R-MAIN P.C.B. CN102 pin 5 (REC Y FM)
ADJ.	GCA
SPEC.	0.37 µsec/2 cycle (5.4 MHz)

Use a signal waveform whose period is shortest.

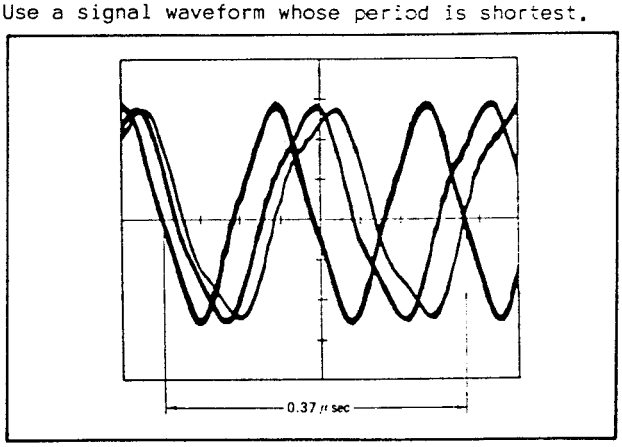


Fig. II-68

6-12 5.17 MHz adjustment

SINGAL	Color bar signal
MODE	REC
M. EQ.	Frequency counter (connect via oscilloscope)
TP/TRIG.	R-MAIN P.C.B. IC105 pin 48 (4.32 MHz)
ADJ.	R-MAIN P.C.B. VC101 (4.32 MHz)
SPEC.	5.166040 MHz ± 10 Hz

6-13 REC Y LEVEL adjustment

SIGNAL	Black signal (on raster, cut R, G and B)
MODE	REC
M. EQ.	Oscilloscope
TP/TRIG.	R-MAIN P.C.B. Q110 pin 3 (REC Y)
ADJ.	R-MAIN P.C.B. VR102 (REC Y)
SPEC.	115 ± 5 mVp-p

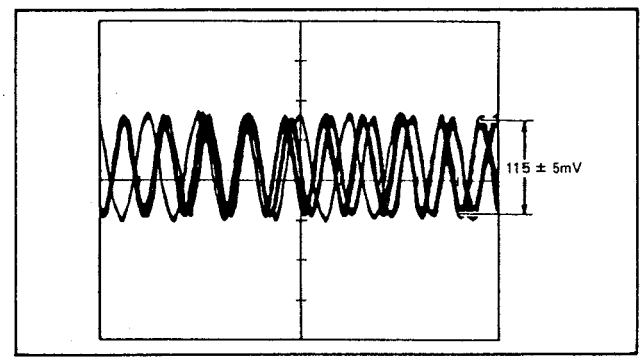


Fig. II-69 5 mV/0.2 µS

6-14 REC C LEVEL adjustments

SIGNAL	Red raster (chroma 350 mVp-p input)
MODE	REC
M. EQ.	Oscilloscope
TP/TRIG.	R-MAIN P.C.B. TP ⓓ (REC C)
ADJ.	R-MAIN P.C.B. VR112 (REC C)
SPEC.	300 ± 10 mVp-p

Note: By the pattern generator VR, align the chroma signal inputted from Y/C separator to 350 mVp-p.

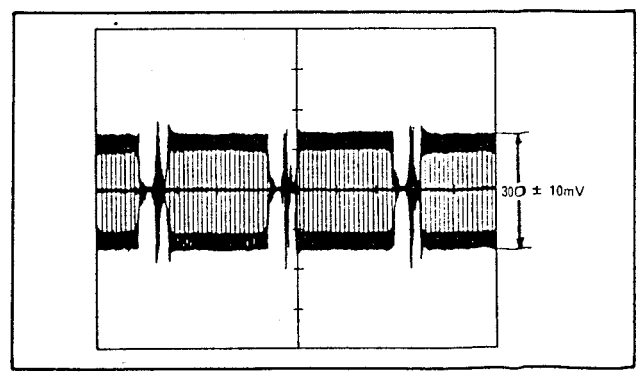


Fig. II-70 10 mV/20 µS

6-15 REC C preset adjustment

SIGNAL	Red raster (chroma 350 mVp-p input)
MODE	REC CN102 ⑤ (REC Y) ⟷ GND R390 side of C380 (REC ATF) ⟷ GND
M. EQ.	Oscilloscope
TP/TRIG.	CH-1: R-MAIN P.C.B. ⓔ (1a) (1 : 1 probe) ⓕ (1b) Ⓖ (2a) Ⓗ (2b) CH-2: R-MAIN P.C.B. CN102 pin 16 (1/2 RF SWP)
ADJ.	R-MAIN P.C.B. VR301 (REC 1A) VR302 (REC 1B) VR303 (REC 2A) VR304 (REC 2B)
SPEC.	35 ± 2 mVp-p

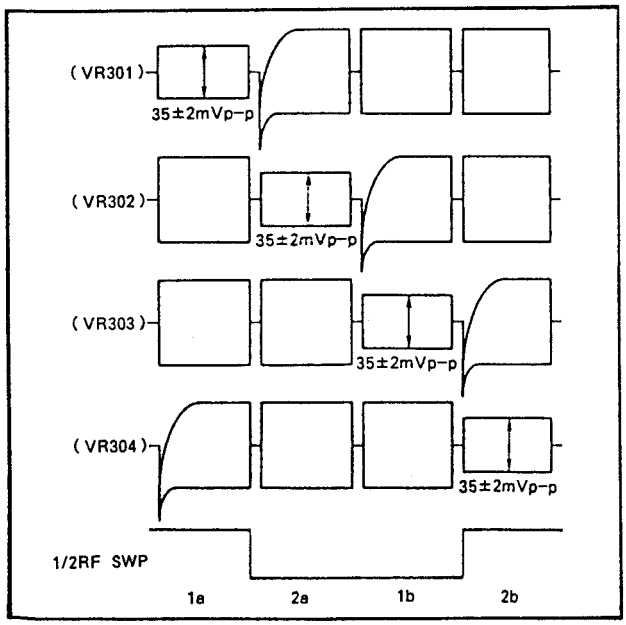
Procedures:

(1) Connect CN102 ⑤ and R390 side of C380 to GND.

(2) Observe each TP and adjust each VR to specified values.

Notes: 1. After adjustment, make recording and playback the recorded part and make sure the display does not flicker conspicuously.
If it does, readjust only the head where the level at pin 6 of FL105 is excessively dispersed so as to remedy it.

2. The chroma signal inputted from Y/C must be 350 mVp-p with a probe of 1:1 used.
(Adjust the pattern generator VR.)



6-16 REC AUDIO LEVEL adjustment

SIGNAL	No signal (terminal open)
MODE	REC R390 side of C380 (REC ATF) ⟷ GND
M. EQ.	Oscilloscope
TP/TRIG.	R-MAIN P.C.B. ⓔ /CN102 pin 16 (1/2RF SWP)
ADJ.	R-MAIN P.C.B. VR111 (REC AUDIO)
SPEC.	6 ± 1 mVp-p

Adjust as specified the amplitude of signal at 1a.

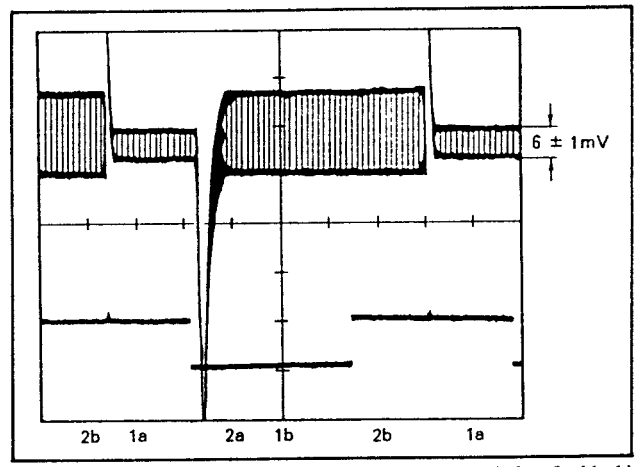


Fig. II-72 10 mV/10 mS (1:1)

6-17 REC ATF LEVEL adjustment

SIGNAL	No signal (terminal open)
MODE	REC VR111 center point (REC A) ⟷ GND
M. EQ.	Oscilloscope
TP/TRIG.	R-MAIN P.C.B. ⓔ /CN102 pin 16 (1/2RF SWP)
ADJ.	R-MAIN P.C.B. VR109 (REC ATF)
SPEC.	6 ± 1 mVp-p

Adjust as specified the amplitude of signal at 1a.

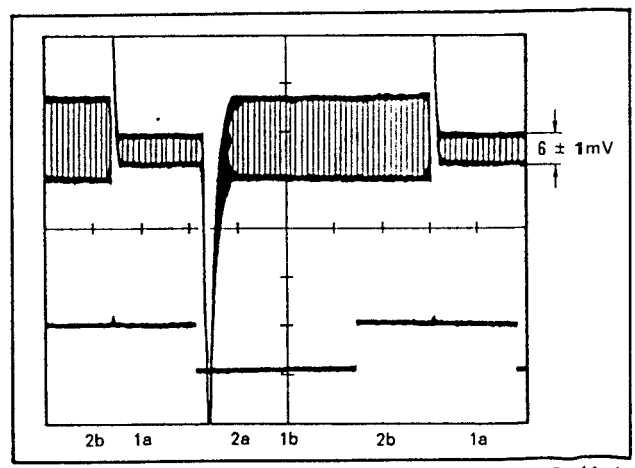
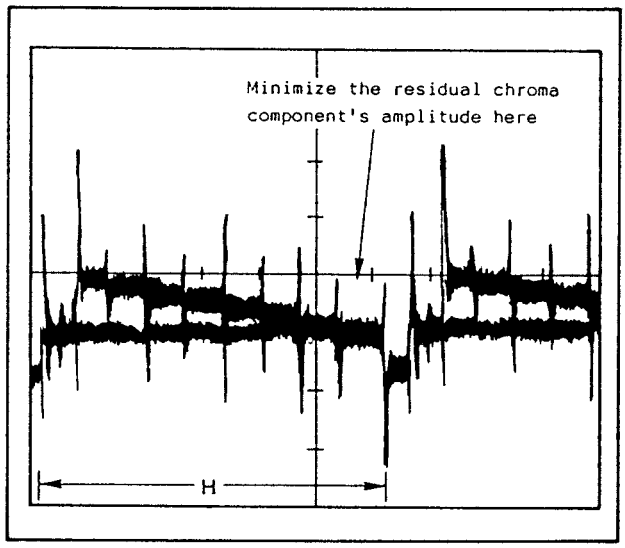


Fig. II-73 10 mV/10 mS (1:1)

6-18 YC separation adjustment

SIGNAL	Color bar
MODE	LINE IN (Service mode 3)
M. EQ.	Oscilloscope
TP/TRIG.	R-MAIN P.C.B. C241 side of R108
ADJ.	R-MAIN P.C.B. VR104 (Y/C SEP)
SPEC.	Minimize chroma component. (Minimize residual chroma component's amplitude.)

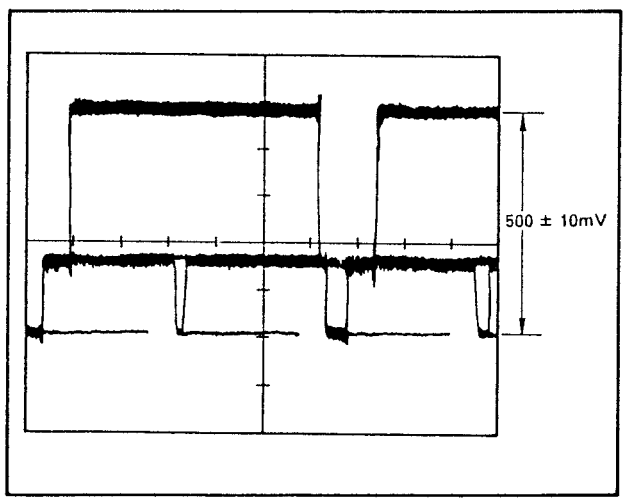


20 mV/10 μS

Fig. II-74

6-19 LINE Y LEVEL adjustment

SIGNAL	White 100% video signal
MODE	LINE IN Service mode 3 (REC)
M. EQ.	Oscilloscope
TP/TRIG.	R-MAIN P.C.B. CN102 side of C265
ADJ.	R-MAIN P.C.B. VR105 (Y LEVEL)
SPEC.	500 ± 10 mV



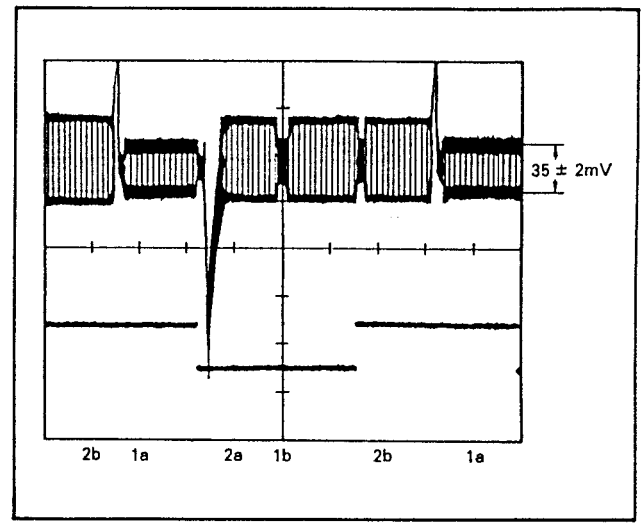
10 mV/10 μS

Fig. II-75

6-20 LINE C LEVEL adjustment

SIGNAL	Red raster
MODE	LINE IN (Service mode 3)
M. EQ.	Oscilloscope
TP/TRIG.	R-MAIN P.C.B. ⓔ
ADJ.	R-MAIN P.C.B. VR101 (LINE C LEVEL)
SPEC.	35 ± 2 mVp-p

Adjust as specified the amplitude of signal at 1a.

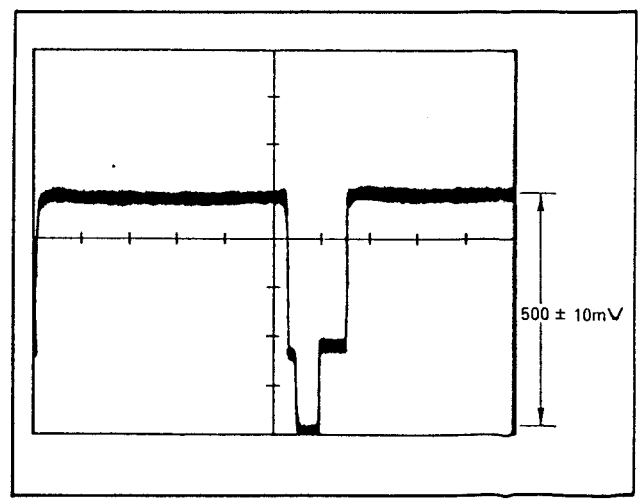


20 mV/10 mS (1:1)

Fig. II-76

6-21 PB Y LEVEL adjustment

SIGNAL	White 100% video signal
MODE	REC/PB
M. EQ.	Oscilloscope
TP/TRIG.	R-MAIN P.C.B. CN102 side of C116
ADJ.	R-MAIN P.C.B. VR103 (PB Y LEVEL)
SPEC.	500 ± 10 mVp-p



10 mV/10 μS

Fig. II-77

6-22 A-FM carrier adjustment

SIGNAL	No signal (terminal open, no microphone)
MODE	REC
M. EQ.	Frequency counter (connected via oscilloscope)
TP/TRIG.	R-MAIN P.C.B. VR111 center point (REC A)
ADJ.	R-MAIN P.C.B. VR602 (A-CAR)
SPEC.	1.5 MHz ± 5 kHz

6-23 A-FM deviation adjustment

SIGNAL	Alignment tape E (Monosco) (DY9-1062-000)
MODE	PB
M. EQ.	Oscilloscope
TP/TRIG.	R-MAIN P.C.B. CN102 pin 18 (AUDIO I/O)
ADJ.	R-MAIN P.C.B. VR601 (A-DEV)
SPEC.	1000 ± 50 mVp-p

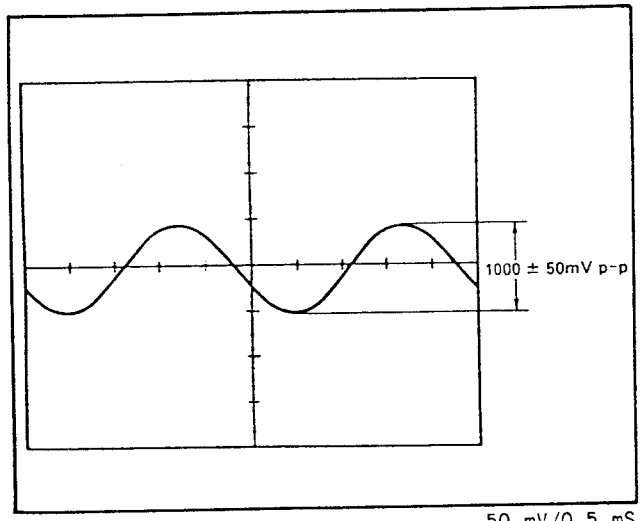


Fig. II-79

6-24 Character position of character generator adjustment

SIGNAL	Color bar signal
MODE	REC PB
M. EQ.	Monitor TV
ADJ.	R-MAIN P.C.B. VC401 (CG SIZE)
SPEC.	The border between blue and black must be in the middle of rightmost digit and the second digit.

Connect the EVF to display characters by remote controller.

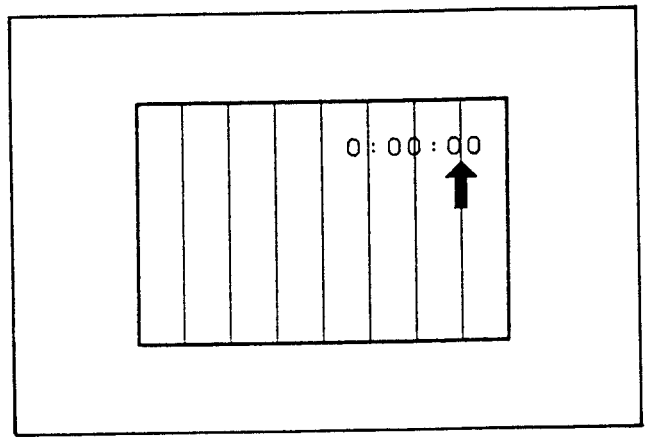


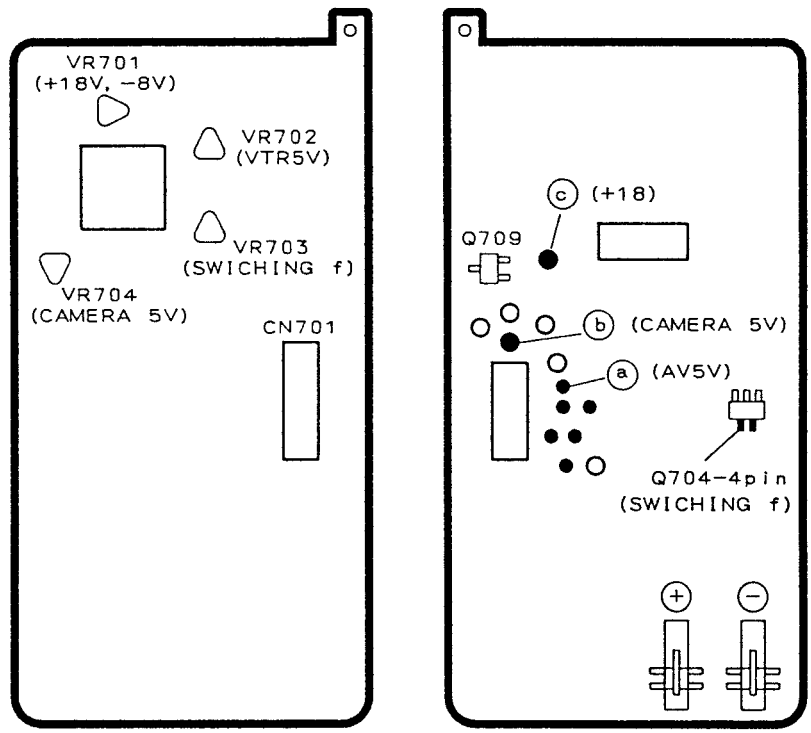
Fig. II-80

6-25 JOG chrominance phase adjustment

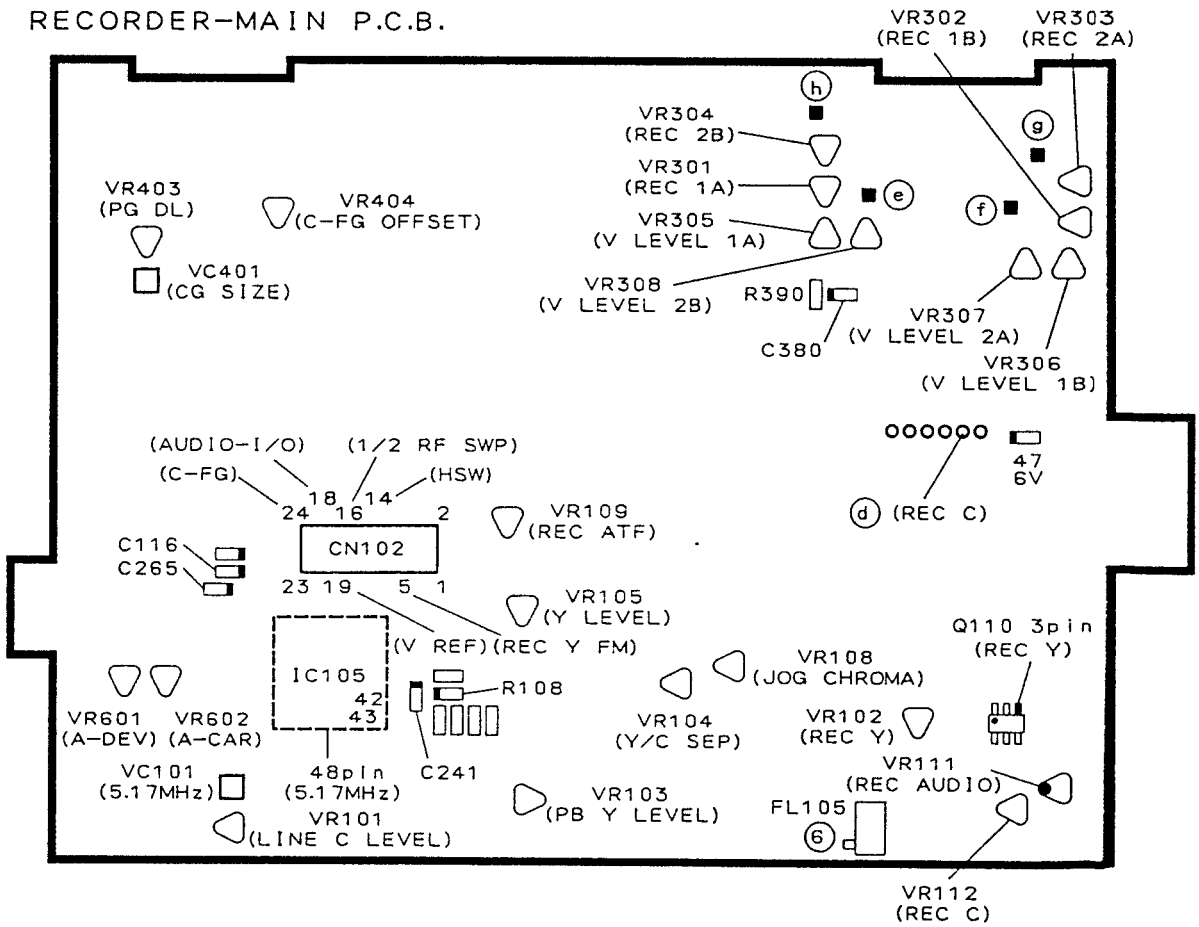
SIGNAL	Color bar signal (REC/PB)
MODE	SEARCH
M. EQ	Monitor TV
ADJ.	R-MAIN C.B.A. VR108 (JOG BURST)
SPEC.	Reduce black noise bars appearing under each white noise bars as possible.

TP/VR and VC list

POWER SUPPLY P.C.B.



RECORDER-MAIN P.C.B.



7. EVF Adjustment

7-1 Free run frequency adjustment

SIGNAL	No signal (terminal open)
MODE	LINE IN
M. EQ.	Oscilloscope, frequency counter
TP/TRIG.	EVF P.C.B. TP2916 (HD)
ADJ.	EVF P.C.B. VR2902 (H. PHASE)
SPEC.	16.4 ± 0.2 KHz

7-2 Vertical amplitude adjustment

SIGNAL	Round subject
MODE	EE
M. EQ.	EVF, Monitor TV
ADJ.	EVF P.C.B. TP2901 (V-SIZE)
SPEC.	Compare with monitor TV picture. Strange feeling is not allowed.

Procedures:

(1) Shoot a round subject (capable of examining vertical distortion) and adjsut the angle of view over the entire screen.

(2) Compare the EVF picture with the monitor TV picture.
Adjust VR2901 so there will be no sense of strangeness.

7-3 Rotation and centering adjustment

MODE	EE
M. EQ.	EVF
ADJ.	Deflection yoke, centering magnet
SPEC.	Picture must not tilt and must be centered.

Procedures:

(1) Choose a subject capable of judging the centering.

(2) Loosen the fastening ring so the deflection yoke can be moved.

(3) Rotate the deflection yoke to correct a tilted picture.
Note: Tighten the centering magnet to such a degree that it is just movable.

(4) Move the centering magnet so as to center the image.

(5) Completely tighten the fastening ring.
Note: Do not tighten excessively.

(6) Fix the centering magnet by applying paint or the like (at 180° interval, 2 points).

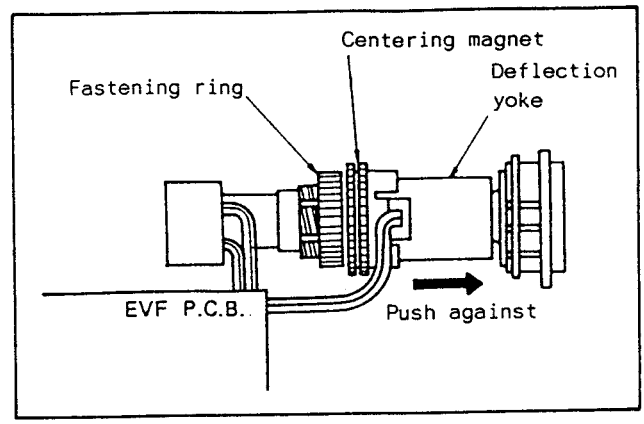


Fig. II-81

7-4 Brightness adjustment

SIGNAL	Self recording playback tape (grayscale)
MODE	PLAY
M. EQ.	EVF
ADJ.	EVF P.C.B. VR2904 (BRIGHT)
SPEC.	Up to 11th stage of grayscale must be discernible.

7-5 Focus adjustment

MODE	Lens capped (character display)
M. EQ.	EVF
ADJ.	EVF P.C.B. VR2903 (FOCUS)
SPEC.	EVF character focus must be optimum

The focus and brightness are adjustable without disassembling.

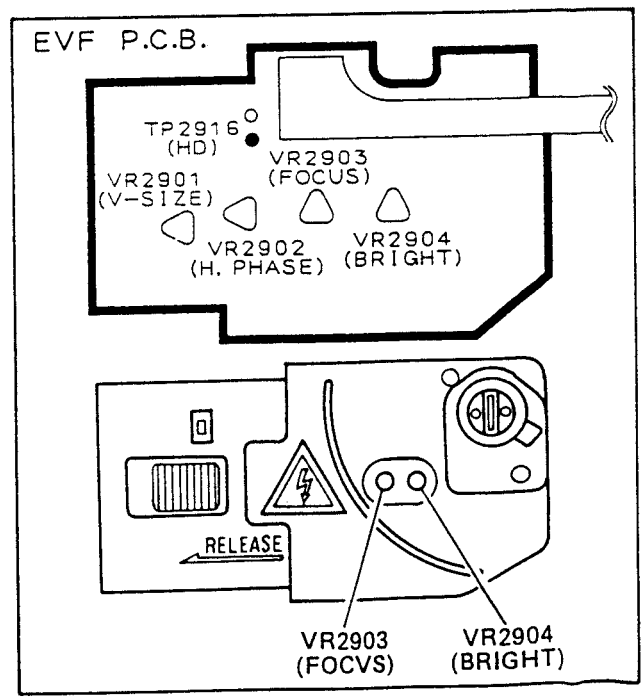


Fig. II-82

8. Checking and Adjusting Items after Replacing Main Parts

After replacing main parts, carry out adjustment referring to the table below. It is a reference material indicating minimum necessary adjustments after replacing a main part and not after replacing several parts or in case of particular symptoms.

Table II-6 (1/2)

o : Adjust Δ : Check

No.	Adjustment	Replaced parts								
		CCD	C-MAIN P.C.B.	R-MAIN P.C.B.	POWER SUPPLY P.C.B.	EVF P.C.B.	AF MI-COM.	CAMERA MI-COM.	MAIN MI-COM.	DRUM
4-1	CZ		o				o			
4-2	ES offset									
5-1	Clock frequency									
5-2	PLL									
5-3	DM-PLL									
5-4	CCD RESET	o	o					o		
5-5	OB set	o	o					o		
5-6	Auto iris	o	o					o		
5-7	Y AGC	o	o					o		
5-8	1/2 fH color difference offset	o	o					o		
5-9	Chroma offset	o	o					o		
5-10	Color difference coincidence	o	o					o		
5-11	Carrier balance	o	o					o		
5-12	Burst phase									
5-13	Burst level		o					o		
5-14	White balance	o	o					o		
5-15	Color balance	o	o					o		
5-16	FAWB	o	o					o		
5-17	Color difference level fetch (low color temperature)	o	o							
5-18	Color difference level fetch (high color temperature)	o	o					o		
5-19	IRIS encoder		o					o		
5-20	Knee point	o	o					o		
5-21	White clip	o	o					o		
5-22	White level value write	o	o					o		
5-23	Blooming	o	o							
6-1	Destination setting		o							
6-2	Undercut		o	o				o	o	
6-3	Switching frequency				Δ					
6-4	VTR 5V				Δ					
6-5	CAMERA 5V				Δ					
6-6	+18V				Δ					
6-7	Switching point			o					Δ	o
6-8	Capstan FG offset			o						
6-9	V REF		o	o				o		
6-10	Y FM carrier		o	o				o		
6-11	Y FM deviation		o	o				o		
6-12	4.32 MHz			Δ						
6-13	REC Y LEVEL			Δ						
6-14	REC C LEVEL			Δ						
6-15	REC C preset			Δ						

Table II-6 (2/2)

o : Adjust Δ : Check

No.	Adjustment	Replace parts								
		CCD	C-MAIN P.C.B.	R-MAIN P.C.B.	POWER SPPLY P.C.B.	EVF P.C.B.	AF MI-COM.	CAMERA MI-COM.	MAIN MI-COM.	DRUM
6-16	REC AUDIO LEVEL			Δ						
6-17	REC ATF LEVEL			Δ						
6-18	YC separation			Δ						
6-19	LINE Y LEVEL			Δ						
6-20	LINE C LEVEL			Δ						
6-21	PB Y LEVEL			Δ						
6-22	A-FM carrier			Δ						
6-23	A-FM deviation			Δ						
6-24	Character position of character generator			Δ						
6-25	JOG chrominance phase			Δ						
7-1	Free run frequency					Δ				
7-2	Vertical amplitude					o				
7-3	Rotation, centering					o				
7-4	Brightness					o				
7-5	Focus					o				

CONTENTS

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ELECTRICAL PARTS LIST ..... Ⅲ – 13

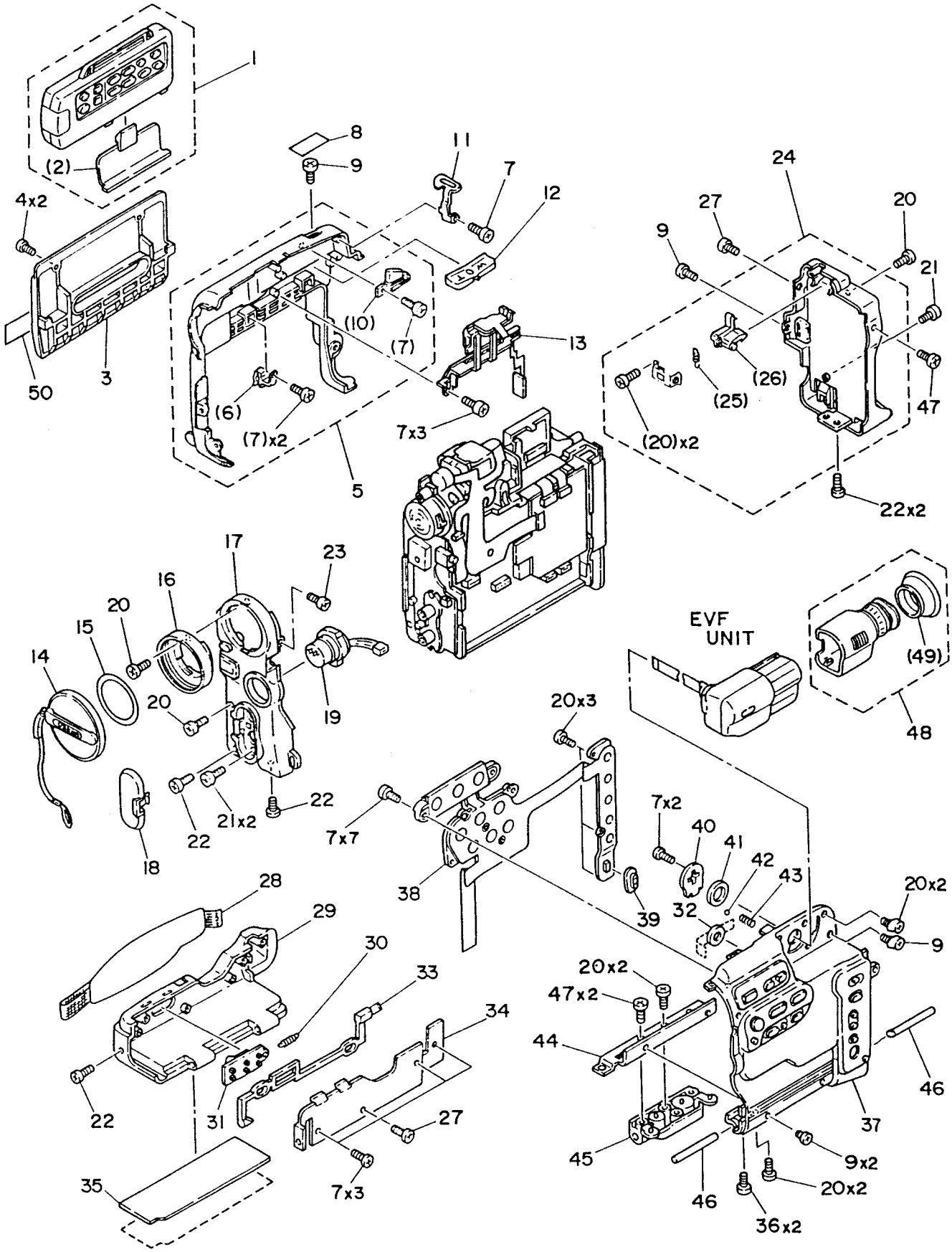
PARTS LIST ..... Ⅲ – 18

CAUTION

1. ESPECIALLY CRITICAL PARTS IN THE POWER CIRCUIT BLOCK SHOULD NOT BE REPLACED WITH OTHER MARKS.
   CRITICAL PARTS ARE MARKED WITH ⚠ IN THIS ELECTRICAL PARTS LIST.

2. THE NUMBERS INDICATED ON THE CONNECTORS DO NOT CORRESPOND TO THE SYMBOL NUMBERS.
   PLEASE CHECK THE CORRECT SYMBOL NUMBERS OF THE CONNECTORS ON THE INTERCONNECTION SCHEMATIC DIAGRAM.

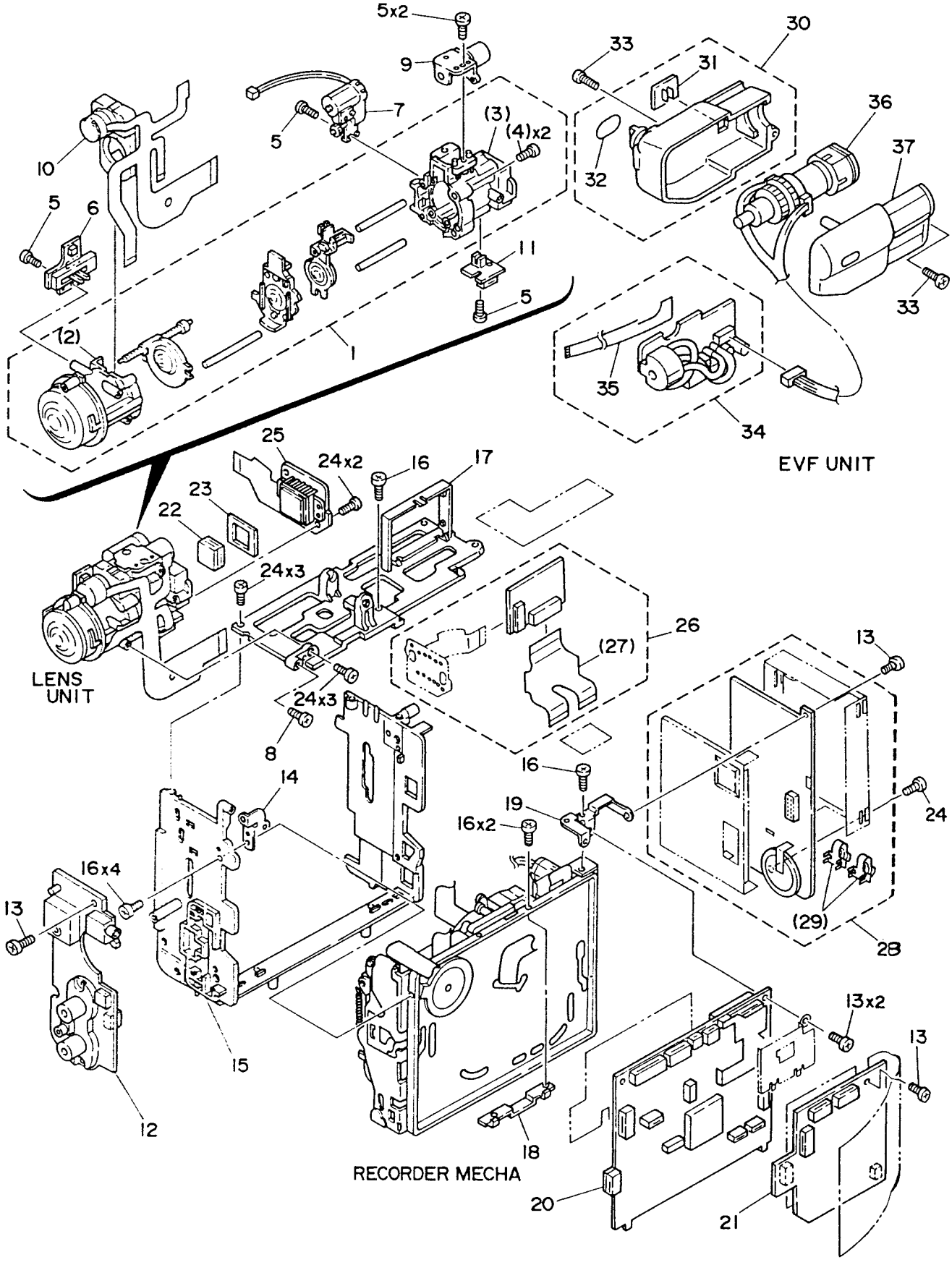
Casing Parts Section



MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DY1-7215-000 000	B	1	WIRELESS CONTROLLER WL-1	
2	DY4-4383-000 000	B	1	COVER, BATTERY	
3	DG1-2012-000 000	B	1	COVER, CASSETTE	
4	XA1-7140-309 000	F	2	SCREW	
5	DY1-7256-000 000	B	1	LEFT COVER ASS'Y	
6	DA1-5070-000 000	B	2	HOLDER, WL-1	
7	XA9-0570-000 000	F	19	SCREW	
8	DA1-5442-000 000	B	1	SEAL	
9	XA1-7170-229 000	F	5	SCREW	
10	DA1-5078-000 000	B	1	KNOB, MODE SWITCH	
11	DA1-5081-000 000	B	1	BAR, STRAP ATTACHMENT	
12	DY1-7220-000 000	B	1	KNOB, TELE/WIDE	
13	DY1-7221-000 000	C	1	KEY-1 P.C.B. ASS'Y	
14	DG1-1812-000 000	B	1	CAP, LENS	
15	DA1-5111-000 000	B	1	SEAL, HOOD	
16	DY1-7223-000 000	B	1	HOOD	
17	DG1-1739-000 000	B	1	FRONT COVER ASS'Y	
18	DA1-5106-000 000	B	1	COVER, AV	
19	DH9-0558-000 000	B	1	MICROPHONE	
20	XA4-9170-459 000	F	14	SCREW	
21	XA4-9170-709 000	F	3	SCREW	
22	XA1-7170-309 000	F	5	SCREW	
23	XA4-9170-509 000	F	1	SCREW	
24	DG1-1742-000 000	B	1	REAR COVER ASS'Y	
25	DS1-5243-000 000	C	1	SPRING, COIL	
26	DA1-5056-000 000	B	1	KNOB, BATTERY EJECT	
27	XA4-9170-409 000	F	2	SCREW	
28	DA1-5044-000 000	B	1	STRAP, HAND	
29	DA1-5039-000 000	B	1	BOTTOM COVER	
30	DS1-5244-000 000	C	1	SPRING, COIL	
31	DA1-5042-000 000	B	1	KNOB, RELEASE	
32	DH9-0384-000 000	C	1	RING, FERRITE	
33	DA1-5041-000 000	C	1	HOOK, BOTTOM	
34	DA1-5040-000 000	B	1	PLATE, BOTTOM COVER	
35	DA1-5444-000 000	C	1	BASE, NAME PLATE	
36	XA1-7170-509 000	F	2	SCREW	
37	DY1-7257-000 000	B	1	RIGHT COVER ASS'Y	
38	DY1-7222-000 000	C	1	KEY-2 P.C.B. ASS'Y	
39	DA1-5036-000 000	B	1	KNOB, EDIT SWITCH	
40	DA1-5091-000 000	C	1	PLATE, EVF	
41	DA1-5090-000 000	C	1	RING, RUBBER	
42	XG8-1100-582 000	C	1	STEEL BALL	
43	DS1-5255-000 000	C	1	SPRING, COIL	
44	DA1-5046-000 000	C	1	PLATE, RIGHT COVER	
45	DA1-5045-000 000	B	1	TRIPOD SOCKET	
46	DA1-5038-000 000	C	2	HINGE JOINT	
47	XA4-9170-309 000	F	3	SCREW	
48	DG1-1751-000 000	B	1	FINDER ASS'Y	
49	DA1-5099-000 000	B	1	EYE CUP	
50	DA1-5574-000 000	B	1	SEAL	

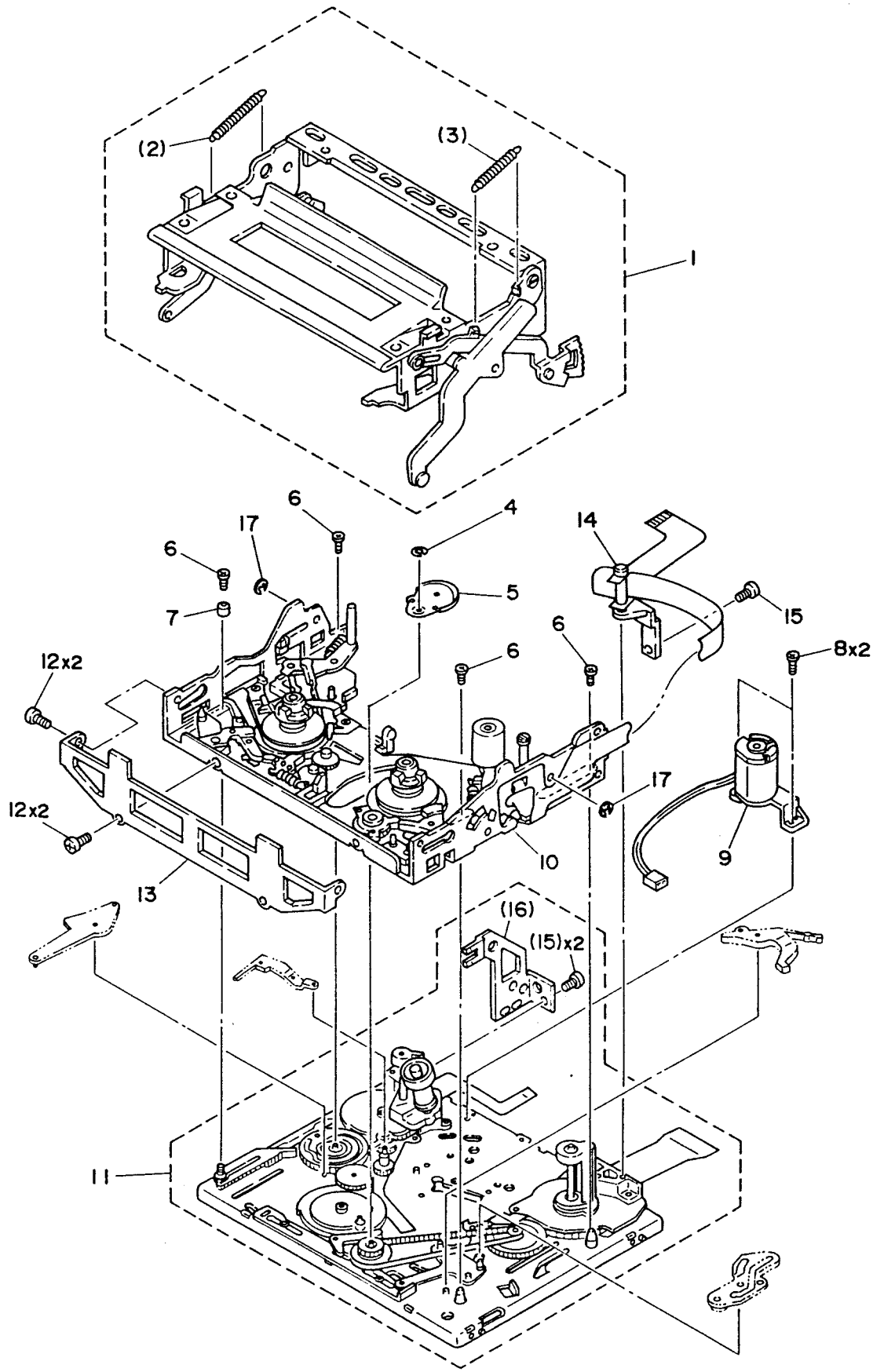
Lens/EVF/Camera·Recorder Units Section



MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DY1-7231-000 000	C	1	ZOOM LENS ASS'Y	
2	YG9-5174-000 000	C	1	FRONT LENS ASS'Y	
3	YA1-0645-000 000	C	1	RELAY HOLDER ASS'Y	
4	XA4-9170-807 000	F	2	SCREW	
5	XA4-4170-457 000	F	5	SCREW	
6	YG9-5178-000 000	C	1	ZOOM ENCODER P.C.B. ASS'Y	
7	YH7-0045-000 000	C	1	PZ MOTOR ASS'Y	
8	XA4-9170-709 000	F	1	SCREW	
9	YH7-0042-000 000	C	1	AF MOTOR ASS'Y	
10	YH8-0028-000 000	C	1	IG METER ASS'Y	
11	YG9-5179-000 000	C	1	RESET P.C.B. ASS'Y	
12	DG1-1733-000 000	C	1	JACK P.C.B. ASS'Y	
13	XA1-7170-257 000	F	5	SCREW	
14	DA1-5011-000 000	C	1	HOLDER(A), RECORDER P.C.B.	
15	DA1-5010-000 000	C	1	HOLDER, RECORDER	
16	XA9-0567-000 000	F	8	SCREW	
17	DG1-1813-000 000	C	1	HOLDER, LENS	
18	DA1-5138-000 000	C	1	PLATE, RECORDER	
19	DA1-5012-000 000	C	1	HOLDER(B), RECORDER P.C.B.	
20	DG1-1762-000 000	C	1	RECORDER-MAIN P.C.B. ASS'Y	
21	DG1-1758-000 000	C	1	CAMERA-MAIN P.C.B. ASS'Y	
22	DH9-0541-000 000	C	1	CRYSTAL FILTER ASS'Y	
23	DA1-4720-000 000	C	1	SPACER	
24	XA4-9170-409 000	F	9	SCREW	
25	DY1-7258-000 000	B	1	CCD ASS'Y	
26	DG1-1757-000 000	C	1	SENSOR P.C.B. ASS'Y	
27	DH2-1489-000 000	C	1	PRINTED CORD	
28	DG1-1734-000 000	C	1	POWER SUPPLY P.C.B. ASS'Y	
29	DA1-5064-000 000	C	2	TERMINAL, BATTERY	
30	DY1-7228-000 000	B	1	LEFT COVER, EVF	
31	DA1-5088-000 000	B	1	KNOB, RELEASE	
32	DA1-4243-000 000	B	1	SEAL	
33	XA4-9170-509 000	F	2	SCREW	
34	DG1-1770-000 000	C	1	EVF P.C.B. ASS'Y	
35	DH2-1487-000 000	C	1	PRINTED CORD	
36	DG1-1752-000 000	C	1	CRT ASS'Y	
37	DY1-7229-000 000	B	1	RIGHT COVER, EVF	

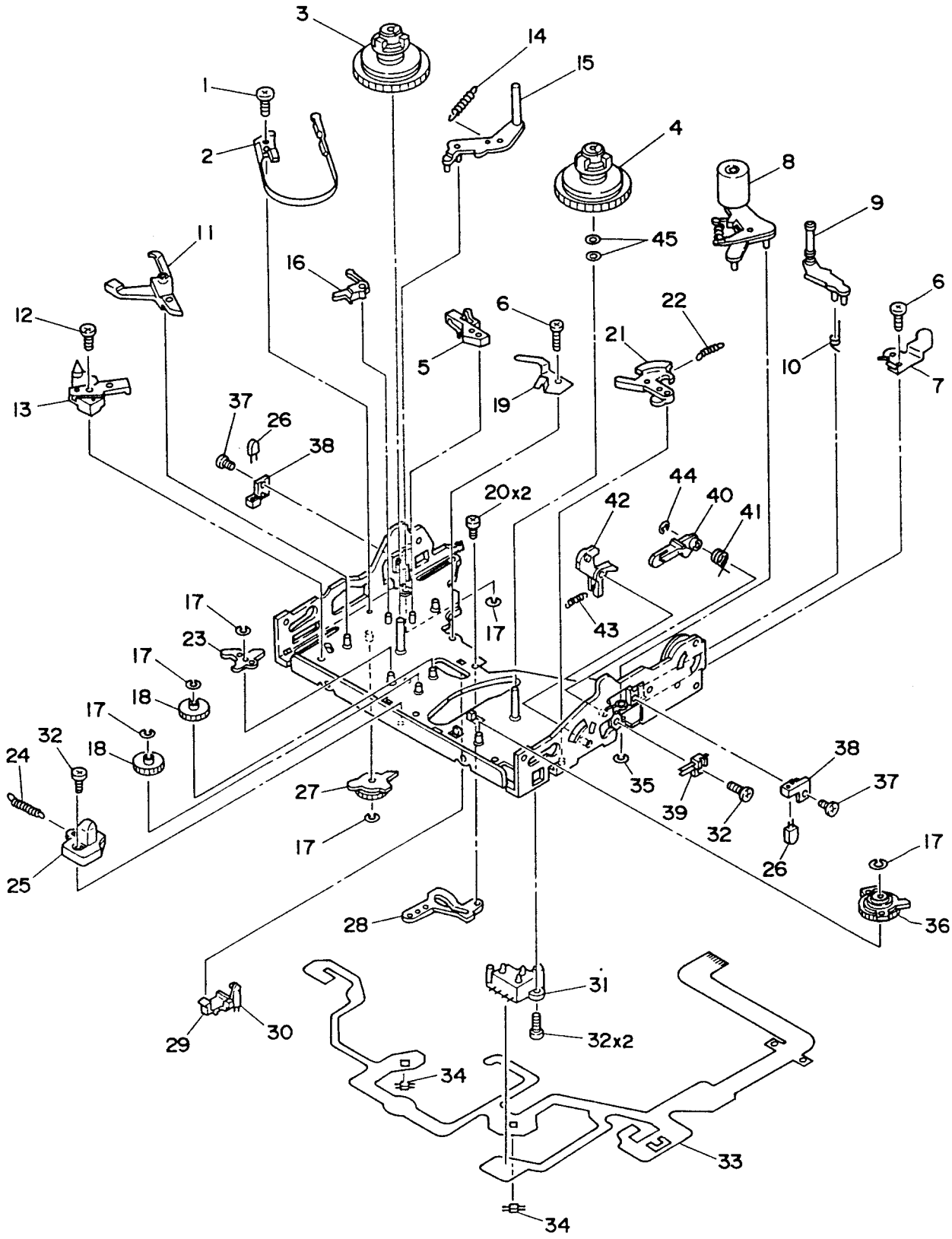
Mechanical Chassis Section I



MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DG1-1945-000 000	C	1	CASSETTE COMPARTMENT ASS'Y	
2	DS1-5250-000 000	C	1	SPRING, COIL	
3	DS1-5251-000 000	C	1	SPRING, COIL	
4	DA1-3312-000 000	F	1	WASHER	
5	DG1-0984-000 000	C	1	IDLER ASS'Y	
6	DA1-5302-000 000	F	4	SCREW	
7	DA1-5291-000 000	C	1	ROLLER	
8	XA1-7140-357 000	F	2	SCREW	
9	DG1-0996-000 000	C	1	MOTOR, M	
10	DY1-7212-000 000	C	1	S CHASSIS ASS'Y	
11	DY1-7213-000 000	C	1	M CHASSIS ASS'Y	
12	XA1-7140-229 000	F	4	SCREW	
13	DA1-5293-000 000	C	1	FRAME	
14	DA1-5292-000 000	C	1	GUIDE, PRINTED CORD	
15	XA1-7140-257 000	F	3	SCREW	
16	DA1-5298-000 000	C	1	PLATE, CATCHING	
17	XD2-1100-132 000	F	2	E RING	

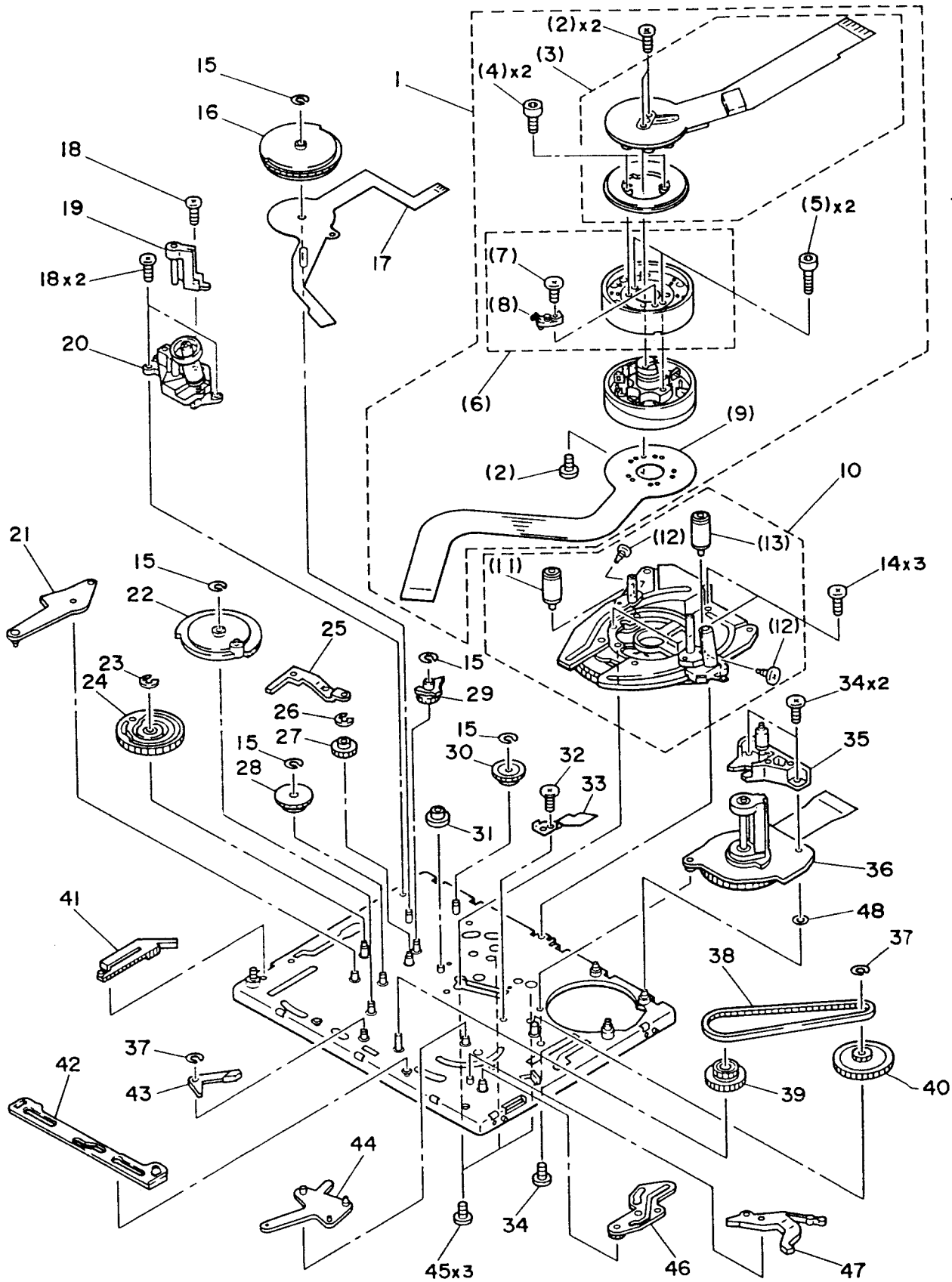
Mechanical Chassis Section 2



MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DA1-3323-000 000	F	1	SCREW	
2	DG1-1949-000 000	C	1	TENSION BAND ASS'Y	
3	DG1-2074-000 000	C	1	REEL SUPPLY	
4	DG1-2075-000 000	C	1	REEL, TAKE UP	
5	DF1-0646-000 000	C	1	LEVER, STOP	
6	XA1-7140-147 000	F	1	SCREW	
7	DA1-5288-000 000	C	1	STOPPER, P12 ARM	
8	DG1-0989-000 000	C	1	PINCH ROLLER ASS'Y	
9	DG1-0990-000 000	C	1	ARM, P12	
10	DS1-6070-000 000	C	1	SPRING, COIL	
11	DA1-5289-000 000	C	1	DRIVE LEVER, RL	
12	XA1-7140-357 000	F	1	SCREW	
13	DA1-5290-000 000	C	1	PIN	
14	DS1-5254-000 000	C	1	SPRING, COIL	
15	DG1-0992-000 000	C	1	TENSION ARM ASS'Y	
16	DA1-3163-000 000	C	1	LOCK LEVER, S	
17	DA1-3312-000 000	F	6	WASHER	
18	DA1-3156-000 000	C	2	GEAR	
19	DA1-3314-000 000	C	1	COVER, TENSION BAND	
20	DA1-3106-000 000	F	2	SCREW	
21	DA1-5287-000 000	C	1	LEVER, TB	
22	DS1-5216-000 000	C	1	SPRING, COIL	
23	DA1-3166-000 000	C	1	BRAKE, LOADING	
24	DS1-5252-000 000	C	1	SPRING, COIL	
25	DA1-5286-000 000	C	1	RELEASE, RL	
26	DH9-0508-000 000	B	2	PHOTO TRANSISTOR PT4850F	
27	DG1-0985-000 000	C	1	LIMITTER, SLB	
28	DA1-3192-000 000	C	1	PLATE, SLIDE	
29	DA1-3170-000 000	C	1	HOLDER, LED	
30	DH9-0470-000 000	B	1	LED GL452	
31	DH9-0468-000 000	C	1	SWITCH, PUSH	
32	XA1-7140-307 000	F	3	SCREW	
33	DH2-1602-000 000	C	1	PRINTED CORD, S CHASSIS	
34	DH9-0469-000 000	B	2	PHOTO REFLECTOR	
35	DA1-3313-000 000	F	1	WASHER	
36	DG1-0986-000 000	C	1	BRAKE, TB	
37	XA1-7140-229 000	F	1	SCREW	
38	DA1-5285-000 000	C	2	HOLDER, SENSOR	
39	DH9-0509-000 000	C	1	SWITCH	
40	DA1-5296-000 000	C	1	LEVER, DOWN	
41	DS1-6081-000 000	C	1	SPRING, COIL	
42	DA1-5284-000 000	C	1	LEVER, LOCK	
43	DS1-5253-000 000	C	1	SPRING, COIL	
44	XD2-1100-132 000	F	1	E RING	
45	DA1-5571-000 000	F	2	WASHER	

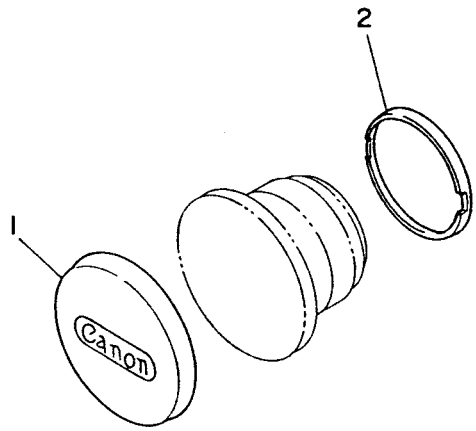
Mechanical Chassis Section 3



MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DY2-1406-000 000	E	1	DRUM ASS'Y	
2	XA1-1140-167 000	F	3	SCREW	
3	DY2-1409-000 000	C	1	MOTOR, DRUM	
4	DA1-3316-000 000	F	2	SCREW	
5	DA1-3317-000 000	F	2	SCREW	
6	DY2-1405-000 000	E	1	UPPER DRUM ASS'Y	
7	DA1-3315-000 000	F	1	SCREW	
8	DF1-0607-000 000	C	1	EARTH	
9	DH2-1220-000 000	C	1	E.P.C., DRUM	
10	DG1-0979-000 000	C	1	LOADING ASS'Y	
11	DF1-0629-000 000	C	1	P5 POST ASS'Y	
12	DA1-3265-000 000	F	2	SCREW	
13	DF1-0630-000 000	C	1	P9 POST ASS'Y	
14	XA1-1140-307 000	F	3	SCREW	
15	DA1-3313-000 000	F	5	WASHER	
16	DF1-0621-000 000	C	1	GEAR, MS	
17	DH2-1601-000 000	C	1	PRINTED CORD, M CHASSIS	
18	XA1-7140-357 000	F	3	SCREW	
19	DF1-0633-000 000	C	1	P2 BASE ASS'Y	
20	DG1-1014-000 000	C	1	P4 BASE ASS'Y	
21	DA1-3195-000 000	C	1	LEVER, MODE (1)	
22	DF1-0622-000 000	C	1	GEAR, SLIDE	
23	XD2-1100-172 000	F	1	E RING	
24	DA1-3152-000 000	C	1	GEAR, CAM	
25	DA1-3168-000 000	C	1	S MODE LEVER	
26	XD2-1100-102 000	F	1	E RING	
27	DA1-3151-000 000	C	1	GEAR	
28	DA1-3154-000 000	C	1	GEAR, SL	
29	DA1-3153-000 000	C	1	GEAR	
30	DA1-3155-000 000	C	1	GEAR	
31	DA1-3318-000 000	C	1	ROLLER	
32	XA1-7140-147 000	F	1	SCREW	
33	DA1-3266-000 000	C	1	PLATE, GUIDE	
34	XA1-7140-257 000	F	3	SCREW	
35	DY2-1400-000 000	C	1	P10 UNIT	
36	DG1-0997-000 000	C	1	CAPSTAN MOTOR	
37	DA1-3312-000 000	F	2	WASHER	
38	DA1-3148-000 000	C	1	BELT, CAPSTAN	
39	DF1-0626-000 000	C	1	GEAR, DRIVE	
40	DF1-0625-000 000	C	1	GEAR, CAPSTAN	
41	DA1-3161-000 000	C	1	RACK, SL	
42	DA1-3190-000 000	C	1	LEVER, MODE (2)	
43	DA1-3167-000 000	C	1	LEVER, NEUTRAL	
44	DA1-3196-000 000	C	1	LEVER, T MODE	
45	XA1-1140-259 000	F	3	SCREW	
46	DF1-1172-000 000	C	1	LEVER, PINCH	
47	DA1-3165-000 000	C	1	LEVER, EJECT	
48	XD1-1102-111 000	F	1	WASHER	

Accessory Parts Section



WD-37,TL-37

MECHANICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
1	DY3-4201-000 000	C	1	CAP, LENS	
2	DY3-4209-000 000	C	1	CAP, DUST(WD-37)	
	DY3-4210-000 000	C	1	CAP, DUST(TL-37)	

ELECTRICAL PARTS

	SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
⚠	C2912	VC7-1430-472 000	D	1	CAPACITOR, CERA 4700pF/125V	
⚠	C2915	VC7-1360-102 000	D	1	CAPACITOR, CERA 1000pF/1KV	
⚠	C2917	VC7-1380-152 000	D	1	CAPACITOR, CERA 1500pF/500V	
	C2919	VC7-1430-562 000	C	1	CAPACITOR, CERA 5600pF/125V	
	CN101	VS1-5347-008 000	C	1	CONNECTOR 8P	
	CN301	VS1-5316-015 000	C	1	CONNECTOR 15P	
	CN401	VS1-5347-008 000	C	1	CONNECTOR 8P	
	CN402	VS1-5347-008 000	C	1	CONNECTOR 8P	
	CN403	VS1-5051-006 000	C	1	CONNECTOR 6P	
	CN404	VS1-5256-016 000	C	1	CONNECTOR 16P	
	CN407	VS1-5267-028 000	C	1	CONNECTOR 28P	
	CN408	VS1-5256-020 000	C	1	CONNECTOR 20P	
	CN409	VS1-5149-015 000	C	1	CONNECTOR 15P	
	CN601	VS1-5267-016 000	C	1	CONNECTOR 16P	
	CN1101	VS1-5256-016 000	C	1	CONNECTOR 16P	
	CN1102	VS1-5256-016 000	C	1	CONNECTOR 16P	
	CN1103	VS1-5336-008 000	C	1	CONNECTOR 8P	
	CN1104	VS1-5336-016 000	C	1	CONNECTOR 16P	
	CN1501	VS1-5256-020 000	C	1	CONNECTOR 20P	
	D001	WA1-1153-000 000	B	1	DIODE DA204U	
	D002	WA1-1153-000 000	B	1	DIODE DA204U	
	D003	WG1-5060-000 000	B	1	LED GL3HD44	
	D004	WA1-0989-000 000	B	1	DIODE MA3100W	
	D005	WA1-0989-000 000	B	1	DIODE MA3100W	
	D006	WA1-0989-000 000	B	1	DIODE MA3100W	
	D007	WA1-0989-000 000	B	1	DIODE MA3100W	
	D008	WA1-0989-000 000	B	1	DIODE MA3100W	
	D101	WA1-1084-000 000	B	1	DIODE MA110	
	D102	WA1-1084-000 000	B	1	DIODE MA110	
	D103	WA1-0380-000 000	B	1	DIODE MA157	
	D104	WA1-5122-000 000	B	1	DIODE DAN222	
	D106	WA1-0962-000 000	B	1	DIODE MA121	
	D107	WA1-1146-000 000	B	1	DIODE MA707	
	D109	WA1-1084-000 000	B	1	DIODE MA110	
	D110	WA1-1084-000 000	B	1	DIODE MA110	
	D112	WA1-1146-000 000	B	1	DIODE MA707	
	D113	WA1-1084-000 000	B	1	DIODE MA110	
	D114	WA1-1153-000 000	B	1	DIODE DA204U	
	D401	WA1-1084-000 000	B	1	DIODE MA110	
	D402	WA1-1146-000 000	B	1	DIODE MA707	
	D403	WA1-0962-000 000	B	1	DIODE MA121	
	D404	WA1-1084-000 000	B	1	DIODE MA110	
	D405	WA1-1146-000 000	B	1	DIODE MA707	
	D406	WA1-1084-000 000	B	1	DIODE MA110	
	D601	WA1-1084-000 000	B	1	DIODE MA110	
	D602	WA1-1084-000 000	B	1	DIODE MA110	
	D603	WA1-1153-000 000	B	1	DIODE DA204U	
	D702	WA1-9003-000 000	B	1	DIODE SB05-05CP	
	D703	WA1-0961-000 000	B	1	DIODE MA112	
	D707	WA1-1146-000 000	B	1	DIODE MA707	
	D710	WA1-1084-000 000	B	1	DIODE MA110	
	D1101	WA1-1084-000 000	B	1	DIODE MA110	
	D1302	WA1-1084-000 000	B	1	DIODE MA110	
	D1401	WA1-5249-000 000	B	1	DIODE 1SV223	
	D1501	WA1-1084-000 000	B	1	DIODE MA110	
	D2901	WA1-0989-000 000	B	1	DIODE MA3100W	
	D2902	WA1-1084-000 000	B	1	DIODE MA110	
	D2903	WA1-1084-000 000	B	1	DIODE MA110	
	D2904	WA1-1123-000 000	B	1	DIODE AG01Z	
	IC001	WA4-5342-000 000	B	1	IC μPC4572G2	

ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
IC003	WA4-5402-000 000	B	1	IC RH5RA35AA	
IC004	WA4-5403-000 000	B	1	IC RH5VA45VA	
IC101	WA3-5122-000 000	B	1	IC SC7S32FEL	
IC102	WA4-5316-000 000	B	1	IC TK11447	
IC103	DH4-0139-000 000	B	1	IC CXL1502M	
IC104	DH4-0180-001 000	B	1	IC CXA1200BQ	
IC105	DH4-0382-000 000	B	1	IC LD5089	
IC107	DH4-0196-000 000	B	1	IC CXA1203N	
IC301	DH4-0192-000 000	B	1	IC CXA1202R	
IC302	DH4-0192-000 000	B	1	IC CXA1202R	
IC401	WA4-5336-000 000	B	1	IC MPC1720ML2	
IC402	DH4-0189-000 000	B	1	IC CXA1127M	
IC403	WA4-5422-000 000	B	1	IC S-81350HG	
IC404	WA4-5161-000 000	B	1	IC CXA1512M	
IC405	DH4-0318-000 000	B	1	IC CXA1127AM	
IC406	DH4-0410-000 000	B	1	IC CXP80724-112Q	
IC407	WA3-5837-000 000	B	1	IC RTC4533	
IC408	DH4-0372-000 000	B	1	IC μPD6451AGT	
IC409	DH4-0135-000 000	B	1	IC CXA1204Q	
IC410	WA4-5164-000 000	B	1	IC μPC393G2	
IC411	WA4-5480-000 000	B	1	IC LM324	
IC412	WA4-1145-000 000	B	1	IC RH5VA45AA	
IC601	DH4-0190-000 000	B	1	IC CXA1237AR	
IC602	WA3-4264-000 000	B	1	IC SC14S66FEL	
IC701	WA4-5332-000 000	B	1	IC MB3783	
IC702	WA4-5424-000 000	B	1	IC LM311DB	
IC1101	DH4-0387-000 000	B	1	IC AN2180FHP	
IC1103	WA3-6124-000 000	B	1	IC MN3861SA	
IC1104	DH4-0406-000 000	B	1	IC LD5090	
IC1301	WA3-6126-000 000	B	1	IC MB88346APFV	
IC1302	WA3-6126-000 000	B	1	IC MB88346APFV	
IC1303	Y22-2673-000 000	B	1	IC SC407631FU	
IC1304	DH4-0389-000 000	B	1	IC PST574CMTR	
IC1401	DH4-0405-000 000	B	1	IC MSM6539-GS	
IC1402	WA3-4264-000 000	B	1	IC SC14S66FEL	
IC1403	WA4-5144-000 000	B	1	IC CXA1393AN	
IC1404	WA3-4264-000 000	B	1	IC SC14S66FEL	
IC1501	DH4-0390-000 000	B	1	IC LD5088	
IC1502	WA4-5337-000 000	B	1	IC LB1837M	
IC1503	WA4-5167-000 000	B	1	IC LB1830M	
IC1504	Y22-2674-000 000	B	1	IC SC400369FU	
IC2901	WA4-5428-000 000	B	1	IC BA7149F	
JC001	DH9-0563-000 000	C	1	JACK, AV	
JC002	DH9-0343-000 000	C	1	JACK, MIC	
⚠ L2902	DH9-0615-000 000	D	1	COIL, LINEARITY	
Q001	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q002	WA2-0646-000 000	B	1	TRANSISTOR 2SD1328	
Q003	WA2-0646-000 000	B	1	TRANSISTOR 2SD1328	
Q004	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q005	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q006	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q101	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q102	WA2-5146-000 000	B	1	TRANSISTOR UMX1	
Q103	WA2-5143-000 000	B	1	TRANSISTOR UMH2	
Q105	WA2-5146-000 000	B	1	TRANSISTOR UMX1	
Q107	WA2-5143-000 000	B	1	TRANSISTOR UMH2	
Q108	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
Q109	WA2-5146-000 000	B	1	TRANSISTOR UMX1	
Q110	WA2-5147-000 000	B	1	TRANSISTOR UMZ1	
Q113	WA2-5155-000 000	B	1	TRANSISTOR DTA114EE	

ELECTRICAL PARTS

SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
Q115	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q116	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q117	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q119	WA2-5140-000 000	B	1	TRANSISTOR DTA144EE	
Q121	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q122	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q125	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
Q126	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q127	WA2-5146-000 000	B	1	TRANSISTOR UMX1	
Q128	WA2-5169-000 000	B	1	FET 2SK880	
Q129	WA2-5146-000 000	B	1	TRANSISTOR UMX1	
Q131	WA2-5152-000 000	B	1	TRANSISTOR 2SB1424	
Q132	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
Q133	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
Q134	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q135	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q137	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q138	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q139	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q140	WA2-5270-000 000	B	1	TRANSISTOR UMA9	
Q141	WA2-5270-000 000	B	1	TRAMSISTOR UMA9	
Q144	WA2-5152-000 000	B	1	TRANSISTOR 2SB1424	
Q145	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
Q146	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
Q147	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q148	WA2-5165-000 000	B	1	TRANSISTOR UMD2	
Q149	WA2-5143-000 000	B	1	TRANSISTOR UMH2	
Q151	WA2-5143-000 000	B	1	TRANSISOTR UMH2	
Q152	WA2-5161-000 000	B	1	TRANSISTOR UMX2	
Q153	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
Q154	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
Q155	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
Q156	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q157	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
Q158	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
Q159	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
Q301	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q302	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
Q303	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q304	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
Q305	WA2-5140-000 000	B	1	TRANSISTOR DTA144EE	
Q306	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q307	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
Q309	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
Q310	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
Q311	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q312	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
Q313	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q314	WA2-5140-000 000	B	1	TRANSISTOR DTA144EE	
Q316	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
Q317	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
Q318	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
Q320	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
Q321	WA2-5147-000 000	B	1	TRANSISTOR UMZ1	
Q322	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
Q323	WA2-1498-000 000	B	1	TRANSISTOR 2SA1162	
Q324	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
Q325	WA2-5346-000 000	B	1	TRANSISTOR 2SA1362	
Q326	WA2-5346-000 000	B	1	TRANSISTOR 2SA1362	
Q327	WA2-5346-000 000	B	1	TRANSISTOR 2SA1362	

ELECTRICAL PARTS

	SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
	Q328	WA2-5346-000 000	B	1	TRANSISTOR 2SA1362	
	Q401	WA2-5266-000 000	B	1	TRANSISTOR UMW1	
	Q402	WA2-5266-000 000	B	1	TRANSISTOR UMW1	
	Q403	WA2-5155-000 000	B	1	TRANSISTOR DTA114EE	
	Q404	WA2-5140-000 000	B	1	TRANSISTOR DTA144EE	
	Q406	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
	Q407	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
	Q408	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
	Q409	WA2-5278-000 000	B	1	TRANSISTOR UMH4	
	Q410	WA2-5144-000 000	B	1	TRANSISTOR UMG4	
	Q411	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
	Q412	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
	Q413	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
	Q414	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
	Q415	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
	Q416	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
	Q417	WA2-5149-000 000	B	1	TRANSISTOR 2SB1412F5	
	Q418	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
	Q419	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
	Q420	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
	Q421	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
	Q601	WA2-0646-000 000	B	1	TRANSISTOR 2SD1328	
	Q602	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
	Q603	WA2-5206-000 000	B	1	TRANSISTOR DTA124EE	
	Q701	WA2-1132-000 000	B	1	TRANSISTOR FMA2	
	Q702	WA2-5340-000 000	B	1	TRANSISTOR 2SK1467	
	Q703	WA2-5290-000 000	B	1	TRANSISTOR FP101	
	Q704	WA2-5290-000 000	B	1	TRANSISTOR FP101	
	Q705	WA2-5290-000 000	B	1	TRANSISTOR FP101	
	Q706	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
	Q707	WA2-5290-000 000	B	1	TRANSISTOR FP101	
	Q709	WA2-1089-000 000	B	1	TRANSISTOR DTC124EK	
	Q710	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
	Q1101	WA2-5161-000 000	B	1	TRANSISTOR UMX2	
	Q1102	WA2-5162-000 000	B	1	TRANSISTOR UMH5	
	Q1103	WA2-5147-000 000	B	1	TRANSISTOR UMZ1	
	Q1104	WA2-5161-000 000	B	1	TRANSISTOR UMX2	
	Q1105	WA2-5161-000 000	B	1	TRANSISTOR UMX2	
	Q1106	WA2-5161-000 000	B	1	TRANSISTOR UMX2	
	Q1107	WA2-5161-000 000	B	1	TRANSISTOR UMX2	
	Q1108	WA2-5161-000 000	B	1	TRANSISTOR UMX2	
	Q1109	WA2-5142-000 000	B	1	TRANSISTOR 2SC4617	
	Q1110	WA2-5147-000 000	B	1	TRANSISTOR UMZ1	
	Q1111	WA2-5141-000 000	B	1	TRANSISTOR 2SA1774	
	Q1401	WA2-5147-000 000	B	1	TRANSISTOR UMZ1	
	Q1402	WA2-5147-000 000	B	1	TRANSISTOR UMZ1	
	Q1403	WA2-5161-000 000	B	1	TRANSISTOR UMX2	
	Q1501	WA2-5139-000 000	B	1	TRANSISTOR DTC144EE	
	Q2901	WA2-0839-000 000	B	1	TRANSISTOR 2SA1126	
	Q2902	WA2-1498-000 000	B	1	TRANSISTOR 2SA1162	
⚠	Q2904	WA2-5151-000 000	D	1	TRANSISTOR 2SD968A-S	
	RI001	DH4-0509-000 000	B	1	REMOTE CONTROL P.C.B. ASS'Y	
	RR701	DH9-0555-000 000	D	1	LINK, IC PRF-1600-F005	
	RR702	DH9-0555-000 000	D	1	LINK, IC PRF-1600-F005	
	RR703	DH9-0555-000 000	D	1	LINK, IC PRF-1600-F005	
⚠	T2901	DH9-0612-000 000	D	1	FLYBACK TRANSFORMER	
	VC101	VC6-0340-300 000	C	1	CAPACITOR TRIMMER 30pF	
	VC401	VC6-0340-300 000	C	1	CAPACITOR TRIMMER 30pF	
	VC1401	VC6-0340-400 000	C	1	CAPACITOR TRIMMER 40pF	
	VE701	DH9-0554-000 000	C	1	LITHIUM, BATTERY	

ELECTRICAL PARTS

	SYMBOL	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
	VR101	VR5-7730-222 000	C	1	RASISTER, VARIABLE 2.2KΩ	
	VR102	VR5-7730-102 000	C	1	RASISTER, VARIABLE 1KΩ	
	VR103	VR5-7730-102 000	C	1	RASISTER, VARIABLE 1KΩ	
	VR104	VR5-7730-103 000	C	1	RASISTER, VARIABLE 10KΩ	
	VR105	VR5-7730-102 000	C	1	RASISTER, VARIABLE 1KΩ	
	VR108	VR5-7730-223 000	C	1	RASISTER, VARIABLE 22KΩ	
	VR109	VR5-7730-223 000	C	1	RASISTER, VARIABLE 22KΩ	
	VR111	VR5-7730-472 000	C	1	RASISTER, VARIABLE 4.7KΩ	
	VR112	VR5-7730-332 000	C	1	RASISTER, VARIABLE 3.3KΩ	
	VR301	VR5-7730-472 000	C	1	RASISTER, VARIABLE 4.7KΩ	
	VR302	VR5-7730-472 000	C	1	RASISTER, VARIABLE 4.7KΩ	
	VR303	VR5-7730-472 000	C	1	RASISTER, VARIABLE 4.7KΩ	
	VR304	VR5-7730-472 000	C	1	RASISTER, VARIABLE 4.7KΩ	
	VR403	VR5-7730-223 000	C	1	RASISTER, VARIABLE 22KΩ	
	VR404	VR5-7730-474 000	C	1	RASISTER, VARIABLE 470KΩ	
	VR601	VR5-7730-223 000	C	1	RASISTER, VARIABLE 22KΩ	
	VR602	VR5-7730-103 000	C	1	RASISTER, VARIABLE 10KΩ	
	VR701	VR5-7730-102 000	C	1	RASISTER, VARIABLE 1KΩ	
	VR702	VR5-7730-102 000	C	1	RASISTER, VARIABLE 1KΩ	
	VR703	VR5-7730-472 000	C	1	RASISTER, VARIABLE 4.7KΩ	
	VR704	VR5-7730-102 000	C	1	RASISTER, VARIABLE 1KΩ	
	VR1501	VR5-7730-223 000	C	1	RASISTER, VARIABLE 22KΩ	
	VR2901	VR7-2130-201 000	C	1	RASISTER, VARIABLE 200Ω	
	VR2902	VR7-2130-223 000	C	1	RASISTER, VARIABLE 22KΩ	
⚠	VR2903	VR7-2170-305 000	D	1	RASISTER, VARIABLE 3MΩ/200V	
	VR2904	VR7-0710-105 000	D	1	RASISTER, VARIABLE 1MΩ/100V	

PARTS LIST

PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
8	DA1-3106-000 000	F	2	SCREW	
10	DA1-3148-000 000	C	1	BELT, CAPSTAN	
10	DA1-3151-000 000	C	1	GEAR	
10	DA1-3152-000 000	C	1	GEAR, CAM	
10	DA1-3153-000 000	C	1	GEAR	
10	DA1-3154-000 000	C	1	GEAR, SL	
10	DA1-3155-000 000	C	1	GEAR	
8	DA1-3156-000 000	C	2	GEAR	
10	DA1-3161-000 000	C	1	RACK, SL	
8	DA1-3163-000 000	C	1	LOCK LEVER, S	
10	DA1-3165-000 000	C	1	LEVER, EJECT	
8	DA1-3166-000 000	C	1	BRAKE, LOADING	
10	DA1-3167-000 000	C	1	LEVER, NEUTRAL	
10	DA1-3168-000 000	C	1	MODE LEVER, S	
8	DA1-3170-000 000	C	1	HOLDER, LED	
10	DA1-3190-000 000	C	1	LEVER, MODE(2)	
8	DA1-3192-000 000	C	1	PLATE, SLIDE	
10	DA1-3195-000 000	C	1	LEVER, MODE(1)	
10	DA1-3196-000 000	C	1	LEVER, T MODE	
10	DA1-3265-000 000	F	2	SCREW	
10	DA1-3266-000 000	C	1	PLATE, GUIDE	
6,8,10	DA1-3312-000 000	F	9	WASHER	
8,10	DA1-3313-000 000	F	6	WASHER	
8	DA1-3314-000 000	C	1	COVER, TENSION BAND	
10	DA1-3315-000 000	F	1	SCREW	
10	DA1-3316-000 000	F	2	SCREW	
10	DA1-3317-000 000	F	2	SCREW	
10	DA1-3318-000 000	C	1	ROLLER	
8	DA1-3323-000 000	F	1	SCREW	
4	DA1-4243-000 000	B	1	SEAL	
4	DA1-4720-000 000	C	1	SPACER	
4	DA1-5010-000 000	C	1	HOLDER, RECORDER	
4	DA1-5011-000 000	C	1	HOLDER(A), RECORDER P.C.B.	
4	DA1-5012-000 000	C	1	HOLDER(B), RECORDER P.C.B.	
2	DA1-5036-000 000	B	1	KNOB, EDIT SWITCH	
2	DA1-5038-000 000	C	2	HINGE JOINT	
2	DA1-5039-000 000	B	1	BOTTOM COVER	
2	DA1-5040-000 000	B	1	PLATE, BOTTOM COVER	
2	DA1-5041-000 000	C	1	HOOK, BOTTOM	
2	DA1-5042-000 000	B	1	KNOB, RELEASE	
2	DA1-5044-000 000	B	1	STRAP, HAND	
2	DA1-5045-000 000	B	1	TRIPOD SOCKET	
2	DA1-5046-000 000	C	1	PLATE, RIGHT COVER	
2	DA1-5056-000 000	B	1	KNOB, BATTERY EJECT	
4	DA1-5064-000 000	C	2	TERMINAL, BATTERY	
2	DA1-5070-000 000	B	2	HOLDER, WL-1	
2	DA1-5078-000 000	B	1	KNOB, MODE SWITCH	
2	DA1-5081-000 000	B	1	BAR, STRAP ATTACHMENT	
4	DA1-5088-000 000	B	1	KNOB, RELEASE	
2	DA1-5090-000 000	C	1	RING, RUBBER	
2	DA1-5091-000 000	C	1	PLATE, EVF	
2	DA1-5099-000 000	B	1	EYE CUP	
2	DA1-5106-000 000	B	1	COVER, AV	
2	DA1-5111-000 000	B	1	SEAL, HOOD	
4	DA1-5138-000 000	C	1	PLATE, RECORDER	
8	DA1-5284-000 000	C	1	LEVER, LOCK	
8	DA1-5285-000 000	C	2	HOLDER, SENSOR	
8	DA1-5286-000 000	C	1	RELEASE, RL	
8	DA1-5287-000 000	C	1	LEVER, TB	
8	DA1-5288-000 000	C	1	STOPPER, P12 ARM	

PARTS LIST

PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
8	DA1-5289-000 000	C	1	DRIVE LEVER, RL	
8	DA1-5290-000 000	C	1	PIN	
6	DA1-5291-000 000	C	1	ROLLER	
6	DA1-5292-000 000	C	1	GUIDE, PRINTED CORD	
6	DA1-5293-000 000	C	1	FRAME	
8	DA1-5296-000 000	C	1	LEVER, DOWN	
6	DA1-5298-000 000	C	1	PLATE, CATCHING	
6	DA1-5302-000 000	F	4	SCREW	
2	DA1-5442-000 000	B	1	SEAL	
2	DA1-5444-000 000	C	1	BASE, NAME PLATE	
8	DA1-5571-000 000	F	2	WASHER	
2	DA1-5574-000 000	B	1	SEAL	
10	DF1-0607-000 000	C	1	EARTH	
10	DF1-0621-000 000	C	1	GEAR, MS	
10	DF1-0622-000 000	C	1	GEAR, SLIDE	
10	DF1-0625-000 000	C	1	GEAR, CAPSTAN	
10	DF1-0626-000 000	C	1	GEAR, DRIVE	
10	DF1-0629-000 000	C	1	P5 POST ASS'Y	
10	DF1-0630-000 000	C	1	P9 POST ASS'Y	
10	DF1-0633-000 000	C	1	P2 BASE ASS'Y	
8	DF1-0646-000 000	C	1	LEVER, STOP	
10	DF1-1172-000 000	C	1	LEVER, PINCH	
10	DG1-0979-000 000	C	1	LOADING ASS'Y	
6	DG1-0984-000 000	C	1	IDLER ASS'Y	
8	DG1-0985-000 000	C	1	LIMITTER, SLB	
8	DG1-0986-000 000	C	1	BRAKE, TB	
8	DG1-0989-000 000	C	1	PINCH ROLLER ASS'Y	
8	DG1-0990-000 000	C	1	ARM, P12	
8	DG1-0992-000 000	C	1	TENSION ARM ASS'Y	
6	DG1-0996-000 000	C	1	MOTOR, M	
10	DG1-0997-000 000	C	1	CAPSTAN MOTOR	
10	DG1-1014-000 000	C	1	P4 BASE ASS'Y	
4	DG1-1733-000 000	C	1	JACK P.C.B. ASS'Y	
4	DG1-1734-000 000	C	1	POWER SUPPLY P.C.B. ASS'Y	
2	DG1-1739-000 000	B	1	FRONT COVER ASS'Y	
2	DG1-1742-000 000	B	1	REAR COVER ASS'Y	
2	DG1-1751-000 000	B	1	FINDER ASS'Y	
4	DG1-1752-000 000	C	1	CRT ASS'Y	
4	DG1-1757-000 000	C	1	SENSOR P.C.B. ASS'Y	
4	DG1-1758-000 000	C	1	CAMERA-MAIN P.C.B. ASS'Y	
4	DG1-1762-000 000	C	1	RECORDER-MAIN P.C.B. ASS'Y	
4	DG1-1770-000 000	C	1	EVF P.C.B. ASS'Y	
2	DG1-1812-000 000	B	1	CAP, LENS	
4	DG1-1813-000 000	C	1	HOLDER, LENS	
6	DG1-1945-000 000	C	1	CASSETTE COMPARTMENT ASS'Y	
8	DG1-1949-000 000	C	1	TENSION BAND ASS'Y	
2	DG1-2012-000 000	B	1	COVER, CASSETTE	
8	DG1-2074-000 000	C	1	REEL, SUPPLY	
8	DG1-2075-000 000	C	1	REEL, TAKE UP	
10	DH2-1220-000 000	C	1	F.P.C., DRUM	
4	DH2-1487-000 000	C	1	PRINTED CORD	
4	DH2-1489-000 000	C	1	PRINTED CORD	
10	DH2-1601-000 000	C	1	PRINTED CORD, M CHASSIS	
8	DH2-1602-000 000	C	1	PRINTED CORD, S CHASSIS	
	DH4-0135-000 000	B	1	IC CXA1204Q	
	DH4-0139-000 000	B	1	IC CXL1502M	
	DH4-0180-001 000	B	1	IC CXA1200BQ	
	DH4-0189-000 000	B	1	IC CXA1127M	
	DH4-0190-000 000	B	1	IC CXA1237AR	
	DH4-0192-000 000	B	2	IC CXA1202R	

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	PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
		DH4-0196-000 000	B	1	IC CXA1203N	
		DH4-0318-000 000	B	1	IC CXA1127AM	
		DH4-0372-000 000	B	1	IC μPD6451AGT	
		DH4-0382-000 000	B	1	IC LD5089	
		DH4-0387-000 000	B	1	IC AN2180FHP	
		DH4-0389-000 000	B	1	IC PST574CMTR	
		DH4-0390-000 000	B	1	IC LD5088	
		DH4-0405-000 000	B	1	IC MSM6539-GS	
		DH4-0406-000 000	B	1	IC LD5090	
		DH4-0410-000 000	B	1	IC CXP80724-112Q	
		DH4-0509-000 000	B	1	REMOTE CONTROL P.C.B. ASS'Y	
		DH9-0343-000 000	C	1	JACK, MIC	
	2	DH9-0384-000 000	C	1	RING, FERRITE	
	8	DH9-0468-000 000	C	1	SWITCH, PUSH	
	8	DH9-0469-000 000	B	2	PHOTO REFLECTOR	
	8	DH9-0470-000 000	B	1	LED GL452	
	8	DH9-0508-000 000	B	2	PHOTO TRANSISTOR PT4850F	
	8	DH9-0509-000 000	C	1	SWITCH	
	4	DH9-0541-000 000	C	1	CRYSTAL FILTER ASS'Y	
		DH9-0554-000 000	C	1	LITHIUM, BATTERY	
		DH9-0555-000 000	D	3	LINK, IC PRF-1600-F005	
	2	DH9-0558-000 000	B	1	MICROPHONE	
		DH9-0563-000 000	C	1	JACK, AV	
⚠		DH9-0612-000 000	D	1	FLYBACK TRANSFORMER	
⚠		DH9-0615-000 000	D	1	COIL, LINEARITY	
	8	DS1-5216-000 000	C	1	SPRING, COIL	
	2	DS1-5243-000 000	C	1	SPRING, COIL	
	2	DS1-5244-000 000	C	1	SPRING, COIL	
	6	DS1-5250-000 000	C	1	SPRING, COIL	
	6	DS1-5251-000 000	C	1	SPRING, COIL	
	8	DS1-5252-000 000	C	1	SPRING, COIL	
	8	DS1-5253-000 000	C	1	SPRING, COIL	
	8	DS1-5254-000 000	C	1	SPRING, COIL	
	2	DS1-5255-000 000	C	1	SPRING, COIL	
	8	DS1-6070-000 000	C	1	SPRING, COIL	
	8	DS1-6081-000 000	C	1	SPRING, COIL	
	6	DY1-7212-000 000	C	1	S CHASSIS ASS'Y	
	6	DY1-7213-000 000	C	1	M CHASSIS ASS'Y	
	2	DY1-7215-000 000	B	1	WIRELESS CONTROLLER WL-1	
	2	DY1-7220-000 000	B	1	KNOB, TELE/WIDE	
	2	DY1-7221-000 000	C	1	KEY-1 P.C.B. ASS'Y	
	2	DY1-7222-000 000	C	1	KEY-2 P.C.B. ASS'Y	
	2	DY1-7223-000 000	B	1	HOOD	
	4	DY1-7228-000 000	B	1	LEFT COVER, EVF	
	4	DY1-7229-000 000	B	1	RIGHT COVER, EVF	
	4	DY1-7231-000 000	C	1	ZOOM LENS ASS'Y	
	2	DY1-7256-000 000	B	1	LEFT COVER ASS'Y	
	2	DY1-7257-000 000	B	1	RIGHT COVER ASS'Y	
	4	DY1-7258-000 000	B	1	CCD ASS'Y	
	10	DY2-1400-000 000	C	1	P10 UNIT	
	10	DY2-1405-000 000	E	1	UPPER DRUM ASS'Y	
	10	DY2-1406-000 000	E	1	DRUM ASS'Y	
	10	DY2-1409-000 000	C	1	MOTOR DRUM	
	12	DY3-4201-000 000	C	1	CAP, LENS	
	12	DY3-4209-000 000	C	1	CAP, DUST(WD-37)	
	12	DY3-4210-000 000	C	1	CAP, DUST(TL-37)	
	2	DY4-4383-000 000	B	1	COVER, BATTERY	
		VC6-0340-300 000	C	2	CAPACITOR, TRIMMER 30pF	
		VC6-0340-400 000	C	1	CAPACITOR, TRIMMER 40pF	
⚠		VC7-1360-102 000	D	1	CAPACITOR, CERA 1000pF/1KV	

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PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
⚠	VC7-1380-152 000	D	1	CAPACITOR, CERA 1500pF/500V	
⚠	VC7-1430-472 000	D	1	CAPACITOR, CERA 4700pF/125V	
	VC7-1430-562 000	C	1	CAPACITOR, CERA 5600pF/125V	
	VR5-7780-102 000	C	6	RASISTER, VARIABLE 1KΩ	
	VR5-7780-103 000	C	2	RASISTER, VARIABLE 10KΩ	
	VR5-7780-222 000	C	1	RASISTER, VARIABLE 2.2KΩ	
	VR5-7780-223 000	C	5	RASISTER, VARIABLE 22KΩ	
	VR5-7780-332 000	C	1	RASISTER, VARIABLE 3.3KΩ	
	VR5-7780-472 000	C	6	RASISTER, VARIABLE 4.7KΩ	
	VR5-7780-474 000	C	1	RASISTER, VARIABLE 470KΩ	
	VR7-0710-105 000	D	1	RASISTER, VARIABLE 1MΩ/100V	
	VR7-2100-201 000	C	1	RASISTER, VARIABLE 200Ω	
	VR7-2100-223 000	C	1	RASISTER, VARIABLE 22KΩ	
⚠	VR7-2170-305 000	D	1	RASISTER, VARIABLE 3MΩ/200V	
	VS1-5051-006 000	C	1	CONNECTOR 6P	
	VS1-5149-015 000	C	1	CONNECTOR 15P	
	VS1-5256-016 000	C	3	CONNECTOR 16P	
	VS1-5256-020 000	C	2	CONNECTOR 20P	
	VS1-5267-016 000	C	1	CONNECTOR 16P	
	VS1-5267-028 000	C	1	CONNECTOR 28P	
	VS1-5316-015 000	C	1	CONNECTOR 15P	
	VS1-5336-008 000	C	1	CONNECTOR 8P	
	VS1-5336-016 000	C	1	CONNECTOR 16P	
	VS1-5347-008 000	C	3	CONNECTOR 8P	
	WA1-0380-000 000	B	1	DIODE MA157	
	WA1-0961-000 000	B	1	DIODE MA112	
	WA1-0962-000 000	B	2	DIODE MA121	
	WA1-0989-000 000	B	6	DIODE MA3100W	
	WA1-1084-000 000	B	16	DIODE MA110	
	WA1-1123-000 000	B	1	DIODE AG01Z	
	WA1-1146-000 000	B	5	DIODE MA707	
	WA1-1153-000 000	B	4	DIODE DA204U	
	WA1-5122-000 000	B	1	DIODE DAN222	
	WA1-5249-000 000	B	1	DIODE 1SV223	
	WA1-9003-000 000	B	1	DIODE SB05-05CP	
	WA2-0646-000 000	B	3	TRANSISTOR 2SD1328	
	WA2-0839-000 000	B	1	TRANSISTOR 2SA1126	
	WA2-1089-000 000	B	1	TRANSISTOR DTC124EK	
	WA2-1132-000 000	B	1	TRANSISTOR FMA2	
	WA2-1337-000 000	B	1	TRANSISTOR 2SC4081	
	WA2-1400-000 000	B	1	TRANSISTOR 2SA1576	
	WA2-1498-000 000	B	2	TRANSISTOR 2SA1162	
	WA2-5139-000 000	B	18	TRANSISOTR DTC144EE	
	WA2-5140-000 000	B	4	TRANSISTOR DTA144EE	
	WA2-5141-000 000	B	18	TRANSISTOR 2SA1774	
	WA2-5142-000 000	B	28	TRANSISTOR 2SC4617	
	WA2-5143-000 000	B	4	TRANSISTOR UMH2	
	WA2-5144-000 000	B	1	TRANSISTOR UMG4	
	WA2-5146-000 000	B	5	TRANSISTOR UMX1	
	WA2-5147-000 000	B	6	TRANSISTOR UMZ1	
	WA2-5149-000 000	B	1	TRANSISTOR 2SB1412F5	
⚠	WA2-5151-000 000	D	1	TRANSISTOR 2SD968A-S	
	WA2-5152-000 000	B	2	TRANSISTOR 2SB1424	
	WA2-5155-000 000	B	2	TRANSISTOR DTA114EE	
	WA2-5161-000 000	B	8	TRANSISTOR UMX2	
	WA2-5162-000 000	B	1	TRANSISTOR UMH5	
	WA2-5165-000 000	B	1	TRANSISTOR UMD2	
	WA2-5169-000 000	B	1	FET 2SK880	
	WA2-5206-000 000	B	1	TRANSISTOR DTA124EE	
	WA2-5266-000 000	B	2	TRANSISTOR UMW1	

PARTS LIST

PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
	WA2-5270-000 000	B	2	TRANSISTOR UMA9	
	WA2-5278-000 000	B	1	TRANSISTOR UMH4	
	WA2-5290-000 000	B	4	TRANSISTOR FP101	
	WA2-5340-000 000	B	1	TRANSISTOR 2SK1467	
	WA2-5346-000 000	B	4	TRANSISTOR 2SA1362	
	WA3-4264-000 000	B	3	IC SC14S66FEL	
	WA3-5122-000 000	B	1	IC SC7S32FEL	
	WA3-5837-000 000	B	1	IC RTC4533	
	WA3-6124-000 000	B	1	IC MN3861SA	
	WA3-6126-000 000	B	2	IC MB88346APFV	
	WA4-1145-000 000	B	1	IC RH5VA45AA	
	WA4-5144-000 000	B	1	IC CXA1393AN	
	WA4-5161-000 000	B	1	IC CXA1512M	
	WA4-5164-000 000	B	1	IC μPC393G2	
	WA4-5167-000 000	B	1	IC LB1830M	
	WA4-5316-000 000	B	1	IC TK11447	
	WA4-5332-000 000	B	1	IC MB3783	
	WA4-5336-000 000	B	1	IC MPC1720ML2	
	WA4-5337-000 000	B	1	IC LB1837M	
	WA4-5342-000 000	B	1	IC μPC4572G2	
	WA4-5402-000 000	B	1	IC RH5RA35AA	
	WA4-5403-000 000	B	1	IC RH5VA45CA	
	WA4-5422-000 000	B	1	IC S-81350HG	
	WA4-5424-000 000	B	1	IC LM311DB	
	WA4-5428-000 000	B	1	IC BA7149F	
	WA4-5480-000 000	B	1	IC LM324	
	WG1-5060-000 000	B	1	LED GL3HD44	
10	XA1-1140-167 000	F	3	SCREW	
10	XA1-1140-259 000	F	3	SCREW	
10	XA1-1140-307 000	F	3	SCREW	
8,10	XA1-7140-147 000	F	2	SCREW	
6,8	XA1-7140-229 000	F	5	SCREW	
6,10	XA1-7140-257 000	F	6	SCREW	
8	XA1-7140-307 000	F	3	SCREW	
2	XA1-7140-309 000	F	2	SCREW	
6,8,10	XA1-7140-357 000	F	6	SCREW	
2	XA1-7170-229 000	F	5	SCREW	
4	XA1-7170-257 000	F	5	SCREW	
2	XA1-7170-309 000	F	5	SCREW	
2	XA1-7170-509 000	F	2	SCREW	
4	XA4-4170-457 000	F	5	SCREW	
2	XA4-9170-309 000	F	3	SCREW	
2,4	XA4-9170-409 000	F	11	SCREW	
2	XA4-9170-459 000	F	14	SCREW	
2,4	XA4-9170-509 000	F	3	SCREW	
4	XA4-9170-709 000	F	5	SCREW	
4	XA4-9170-807 000	F	2	SCREW	
4	XA9-0567-000 000	F	8	SCREW	
2	XA9-0570-000 000	F	19	SCREW	
10	XD1-1102-111 000	F	1	WASHER	
10	XD2-1100-102 000	F	1	E RING	
6,8	XD2-1100-132 000	F	3	E RING	
10	XD2-1100-172 000	F	1	E RING	
2	XG8-1100-582 000	C	1	STEEL BALL	
4	YA1-0645-000 000	C	1	RELAY HOLDER ASS'Y	
4	YG9-5174-000 000	C	1	FRONT LENS ASS'Y	
4	YG9-5178-000 000	C	1	ZOOM ENCODER P.C.B. ASS'Y	
4	YG9-5179-000 000	C	1	RESET P.C.B. ASS'Y	
4	YH7-0042-000 000	C	1	AF MOTOR ASS'Y	
4	YH7-0045-000 000	C	1	PZ MOTOR ASS'Y	

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PARTS LIST

PAGE	PART NO.	CLASS	QTY	DESCRIPTION	REMARKS
4	YH8-0028-000 000	C	1	IG METER ASS'Y	
	Y22-2673-000 000	B	1	IC SC407631FU	
	Y22-2674-000 000	B	1	IC SC400369FU	

CONTENTS

CHAPTER IV. DIAGRAMS

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2-2 SENSOR PROCESS SECTION ..... Ⅳ－3
2-3 SYSCON-SERVO SECTION ..... Ⅳ－4
2-4 AUDIO-VIDEO SECTION ..... Ⅳ－5

3. Circuit Board/Schematic Diagrams
3-1 CAMERA-MAIN P.C.B. ..... Ⅳ－6, 7
3-2 RECORDER-MAIN・POWER SUPPLY P.C.B. (SYSCON-SERVO SECTION) ..... Ⅳ－8, 9
3-3 RECORDER-MAIN P.C.B. (VIDEO SECTION) ..... Ⅳ－10, 11
3-4 JACK EVF P.C.B. ..... Ⅳ－12, 13

< Guide to diagrams>

1. Color coding

(1) Single lines in block diagrams

Camera section
Red (———) : Y
(- - - -) : C

AUTO-FOCUS section
Red (———) : ES/CU

Syscon-servo section
Red (———) : Drum servo signal
(- - - -) : Capstan servo signal

Video section
Red (———) : Recording
(- - - -) : Playback

(2) Voltage on circuit diagram
Red : Recording
Black : Playback

(3) Signal lines in circuit diagrams

Camera section
Red : Power supply line
Blue : Luminance signal
Orange : Chrominance signal
Hatched black (▒▒): Luminance + Chromiannce signals

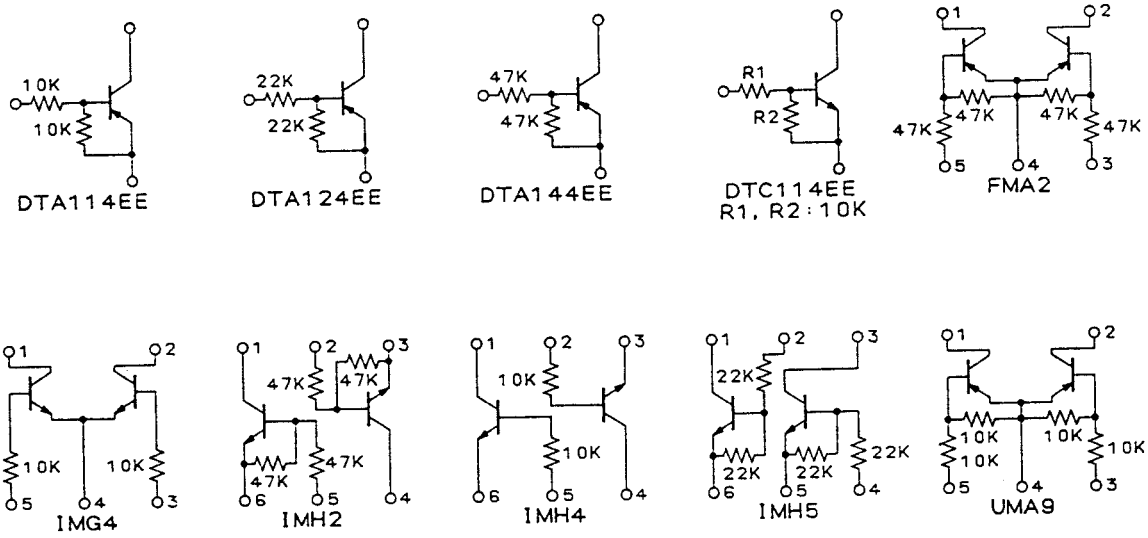
Recorder section
Blue (———) : Capstan PWM signal
(—・—) : Capstan ATF signal
(- - - -) : Capstan FG signal
Orange (———) : Drum PWM signal
(- - - -) : Drum FG signal
(—・—) : Drum PG signal

Recorder section
Gray (———) : Recording luminance + Chrominance signals
(- - - -) : Playback luminance + Chrominance signals
Blue (———) : Recording luminance signal
(- - - -) : Playback luminance signal
(—・—) : Playback capstan ATF signal
Orange (———) : Recording chrominance signal
(- - - -) : Playback chrominance signal
Red (———) : Recording audio signal
(- - - -) : Playback audio signal

(4) PC board layout

Orange	:	Component-side pattern
Hatched black (▒▒▒▒)	:	Soldered-side pattern
Black	:	Parts on component-side
Blue	:	Parts on soldered-side

2. Equivalent circuits of digital transistors



3. Indications in circuit diagram

- Resistance is represented in ohms (Ω).
- Capacitance is represented in farads (F).
- Wattage of resistor is 1/16 W unless otherwise specified.
- Withstand voltage of capacitor is 25 V unless otherwise specified.
- Voltages are measured with a digital voltmeter.
- Waveform photographs are taken by using a 10:1 probe.
- IC Nos. in P.C.B.s are listed on the bottom of diagrams.
- Nos. colored in blue correspond to the Nos. of waveform photographs.
- Voltage values and waveform photographs in circuit diagram are based on the following condition.

Camera section conditions

Colorbar, standard angle of view

Recorder section conditions

Recording : Color bar (pattern generator)

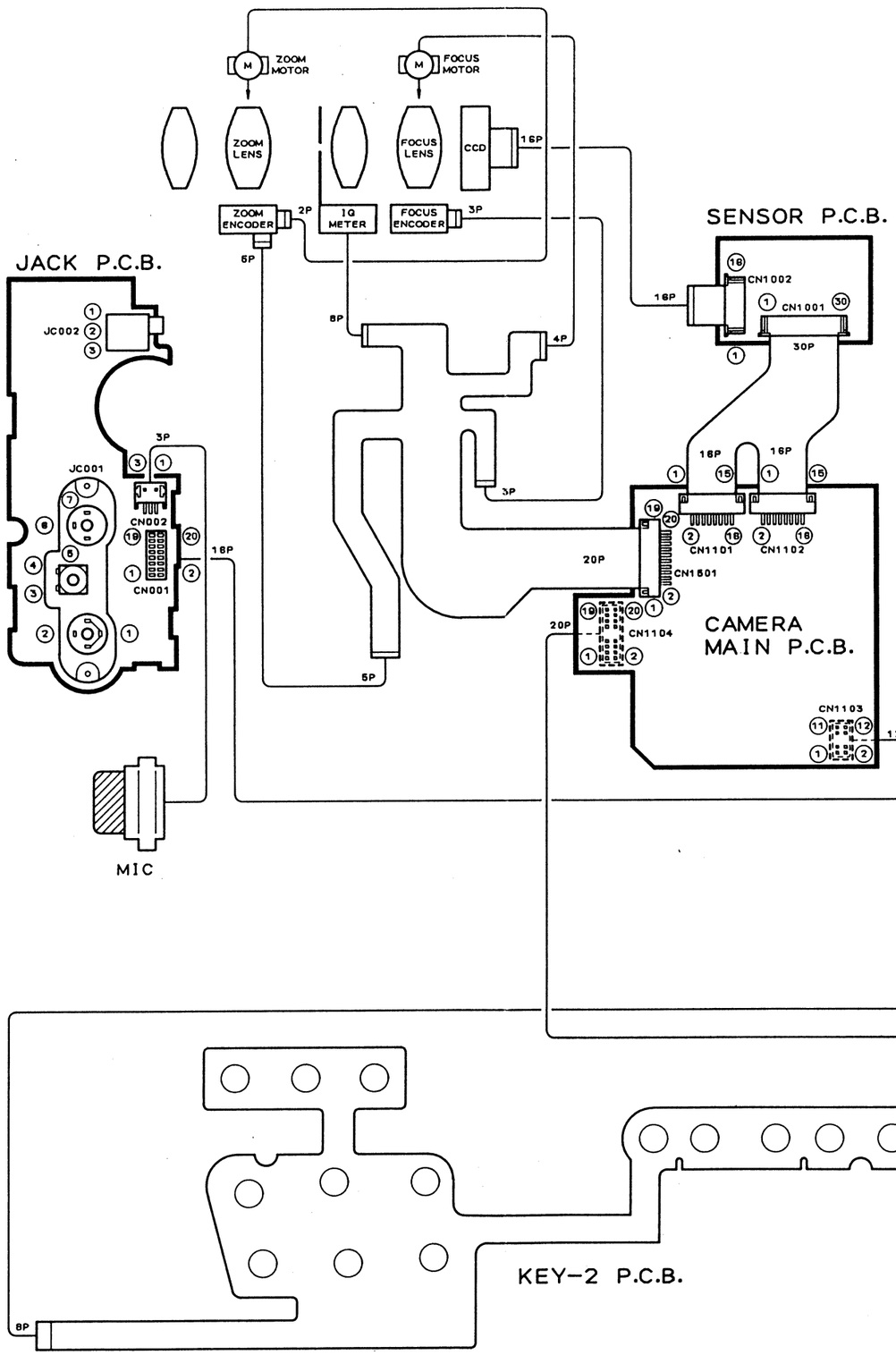
Playback : Self-recording playback (color bar)

INTERCONNECTION DIAGRAM

JACK P.C.B.	
CN001	
1	TALLY
2	GND
3	REMOCON
4	SS 5V
5	A-FADE
6	AV 5V
7	GND
8	MIC-AUDIO
9	GND
10	AUDIO OUT
11	A-MUTE
12	GND
13	RF 5V
14	VIDEO OUT
15	GND
16	VIDEO JACK SW
CN002	
1	GND
2	MIC
3	BIAS

SENSOR P.C.B.	
CN1001	
1	+18V
2	−8V
3	CAMERA 5V
4	CAMERA 5V
5	CSP 1
6	CSP 2
7	GND
8	CLK
9	GND
10	FH/2
11	P BLK
12	CPOB
13	HD
14	VD
15	SHUTTER 1
16	SHUTTER 2
17	SHUTTER 3
18	SHUTTER 4
19	CCD RESET
20	SC
21	GND
22	SC (90)
23	PLL
24	BF
25	CP 2
26	W BLK
27	C BLK
28	SYNC
29	GND
30	S/H OUT
CN1002	
1	H1
2	H2
3	OG
4	LG
5	VO
6	RD
7	R
8	OD
9	IS
10	V. SUB
11	PT
12	ϕV1
13	ϕV2
14	ϕV3
15	ϕV4
16	GND

CAMERA-MAIN P.C.B.	
CN1101	
1	+18V
2	−8V
3	CAMERA 5V
4	CAMERA 5V
5	CSP 1
6	CSP 2
7	GND
8	CLK
9	GND
10	FH/2
11	P BLK
12	CPOB
13	HD
14	VD
15	SHUTTER 1
16	SHUTTER 2
CN1102	
1	SHUTTER 3
2	SHUTTER 4
3	CCD RESET
4	SC
5	GND
6	SC (90)
7	PLL
8	BF
9	CP 2
10	W BLK
11	C BLK
12	SYNC
13	GND
14	S/H OUT
15	NC
16	NC
CN1103	
1	GND
2	GND
3	UNREG 6V (CAM)
4	CAMERA 5V
5	NC
6	NC
7	NC
8	NC
9	GND
10	+18V
11	−8V
12	BACK UP
CN1104	
1	CAMERA (Y)
2	CAMERA (C)
3	GND
4	A-FADE
5	WIDE (L)
6	TELE (L)
7	AF FRAME
8	AF (H) /MANU. (L)
9	NC
10	NC
11	NC
12	NC
13	CLOCK 1
14	C-DATA
15	C-DATA
16	CAMERA REQ
17	CAMERA-CS
18	E²PROM ON
19	NEAR SW (L)
20	FAR SW (L)
CN1501	
1	TELE
2	WIDE
3	GND
4	+3.6V
5	ZOOM POSITION
6	IN (+)
7	OUT (+)
8	IN (−)
9	OUT (−)
10	C (−)
11	C (+)
12	D (−)
13	D (+)
14	PM 1
15	PM 2
16	PM 3
17	PM 4
18	CAMERA 5V
19	RESET SW (L)
20	RESET SENS. LED



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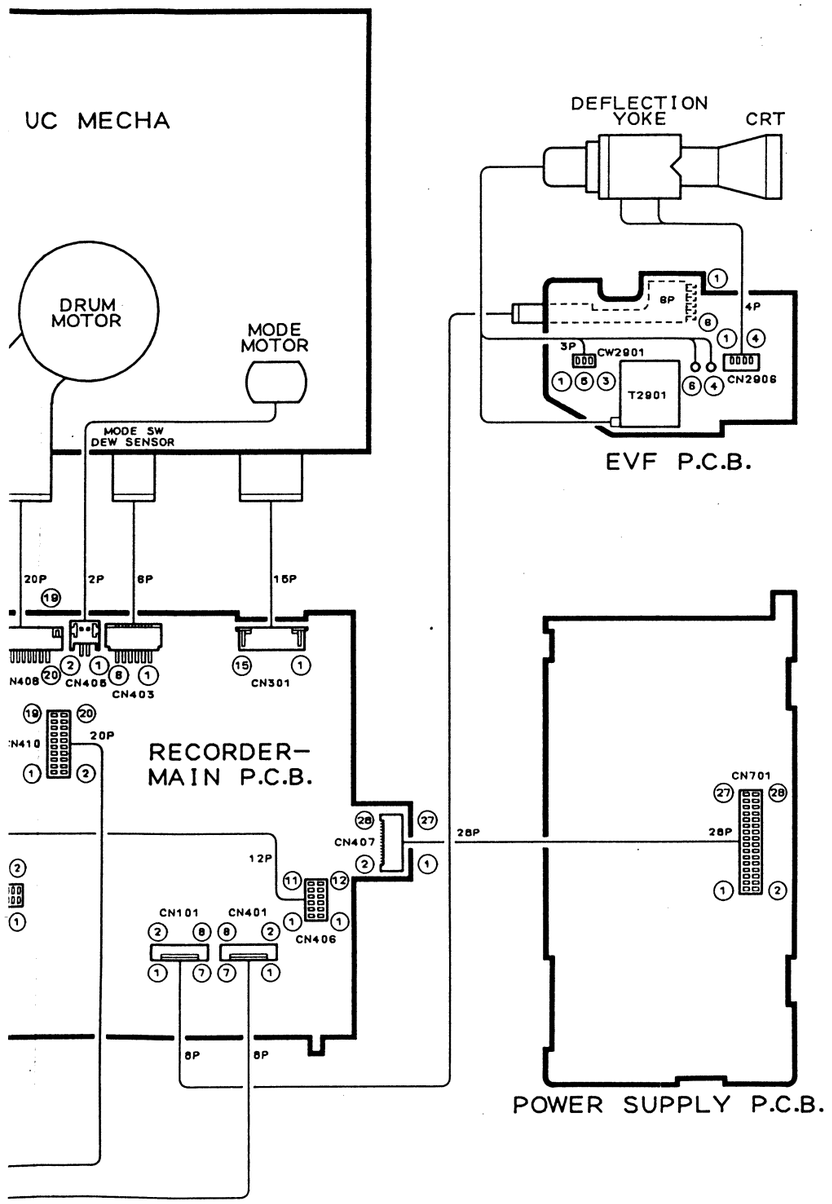

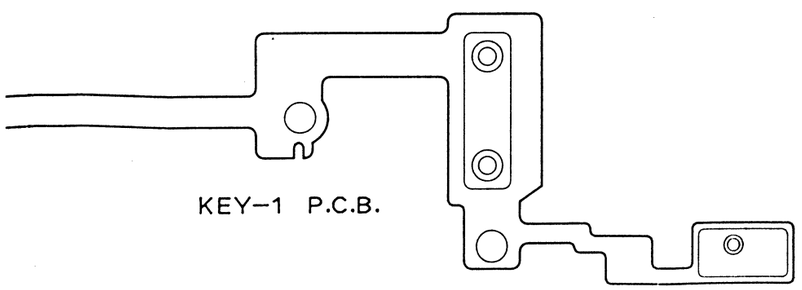

RECORDER-MAIN P.C.B.	
CN101	
1	EVF 5V
2	EVF 5V
3	EVF VIDEO
4	GND
5	VD
6	HD
7	GND
8	GND
CN102	
1	GND
2	SHIFT
3	UNREG 6V
4	CAMERA LED
5	REC Y FM
6	EJECT SW (L)
7	REC Y IN
8	POWER SW (L)
9	HD
10	KEY 1
11	VD
12	AV 5V
13	GND
14	HEAD SW PULSE
15	PB-RF
16	1/2 SWP
17	KEY 2
18	AUDIO OUT
19	V REF
20	GND
21	GND
22	PLAY LED
23	VIDEO OUT
24	C-FG
CN301	
1	FE HEAD
2	GND
3	GND
4	AV 5V
5	CH-2A
6	GND
7	AV 5V
8	CH-1B
9	GND
10	AV 5V
11	CH-1A
12	GND
13	AV 5V
14	CH-2B
15	GND
CN401	
1	POWER SW (L)
2	NC
3	GND
4	ZOOM KEY
5	KEY 1
6	PLAY LED
7	SS 5V
8	CAMERA LED
CN402	
1	GND
2	EDIT OFF (L)
3	NC
4	KEY (+/-)
5	KEY 2
6	GND
7	FAR SW (L)
8	NEAR SW (L)
CN403	
1	GND
2	MODE SW 1
3	MODE SW 2
4	MODE SW 3
5	GND
6	DEW (H)
CN404	
1	TAPE SENS. LED
2	LED GND
3	RELL VCC
4	GND
5	T-REEL FG
6	S-REEL FG
7	EOT SENS (H)
8	SS 5V
9	GND
10	MP (H) /ME (L)
11	H18 SW
12	SAFETY TAB (L)
13	CASSETTE DOWN (L)
14	GND
15	BOT SENS. (H)
16	SS 5V

RECORDER-MAIN P.C.B.	
CN405	
1	LOAD. MTR (+)
2	LOAD. MTR (-)
CN406	
1	GND
2	GND
3	UNREG 6V
4	CAMERA 5V
5	NC
6	GND
7	NC
8	-8V
9	GND
10	+18V
11	-8V
12	BACK UP
CN407	
1	GND
2	GND
3	DRUM-VS
4	CAPSTAN-VS
5	GND
6	GND
7	DRUM ERROR
8	CAPSTAN ERROR
9	BACK UP
10	EJECT SW (L)
11	EVER 5V
12	NC
13	NC
14	UNREG 6V
15	CAMERA ON (L)
18	VTR ON (L)
17	SS 5V
18	AV 5V
19	EVF 5V
20	GND
21	GND
22	UNREG 6V
23	UNREG 6V
24	CAMERA 5V
25	GND
26	GND
27	+18V
28	-8V
CN408	
1	W
2	W
3	V
4	V
5	U
6	U
7	V+
8	V-
9	W+
10	W-
11	COM
12	D-FG
13	D-PG
14	NC
15	U-
16	U+
17	H+
18	H-
19	NC
20	NC
CN409	
1	V+
2	H+
3	U
4	U+
5	U-
6	V-
7	H-
8	W+
9	W-
10	V
11	SS 5V
12	C-FG 1
13	W
14	C-FG 2
15	GND

RECORDER-MAIN P.C.B.	
CN410	
1	CAMERA (Y)
2	CAMERA (C)
3	GND
4	A-FADE
5	WIDE (L)
6	TELE (L)
7	AF FRAME
8	AF (H) /MANU. (L)
9	NC
10	NC
11	NC
12	NC
13	CLOCK 1
14	C-DATA
15	C-DATA
16	CAMERA REQ
17	CAMERA-CS
18	E²PROM ON
19	NEAR SW (L)
20	FAR SW (L)
CN801	
1	FALLY
2	GND
3	REMOCON
4	SS 5V
5	A-FADE
6	AV 5V
7	GND
8	MIC-AUDIO
9	GND
10	AUDIO OUT
11	A-MUTE
12	GND
13	RF 5V
14	VIDEO OUT
15	GND
16	VIDEO JACK SW

POWER SUPPLY P.C.B.	
CN701	
1	GND
2	GND
3	DRUM-VS
4	CAPSTAN-VS
5	GND
6	GND
7	DRUM ERROR
8	CAPSTAN ERROR
9	BACK UP
10	EJECT SW (L)
11	EVER 5V
12	NC
13	NC
14	UNREG 6V
15	CAMERA ON (L)
18	VTR ON (L)
17	SS 5V
18	AV 5V
19	EVF 5V
20	GND
21	GND
22	UNREG 6V
23	UNREG 6V
24	CAMERA 5V
25	GND
26	GND
27	+18V
28	-8V

EVF P.C.B.	
CN2906	
1	H+
2	H-
3	V+
4	V-
CW2901	
1	4. V
3	<
4	33
5	31
6	32
7	4

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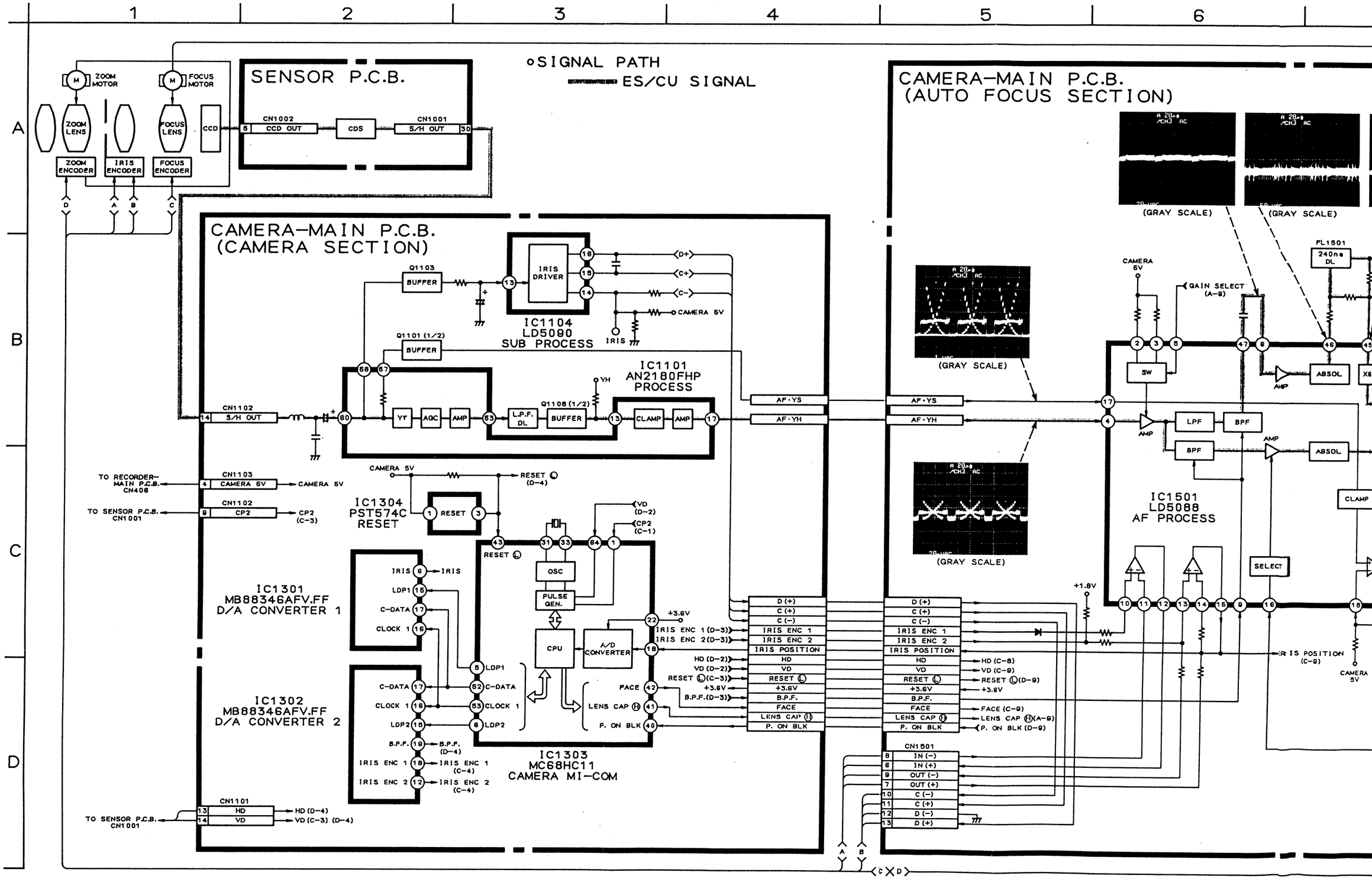

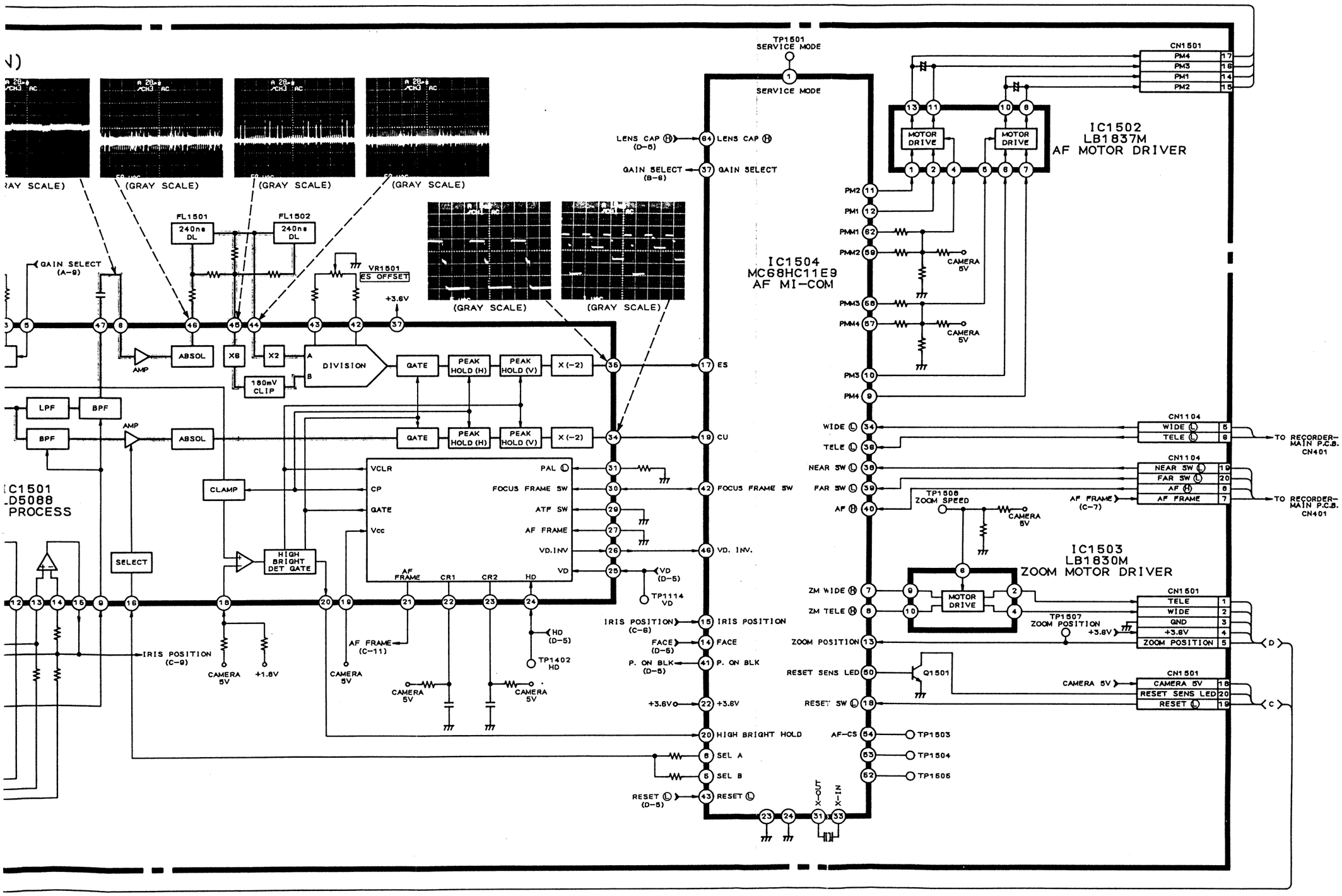

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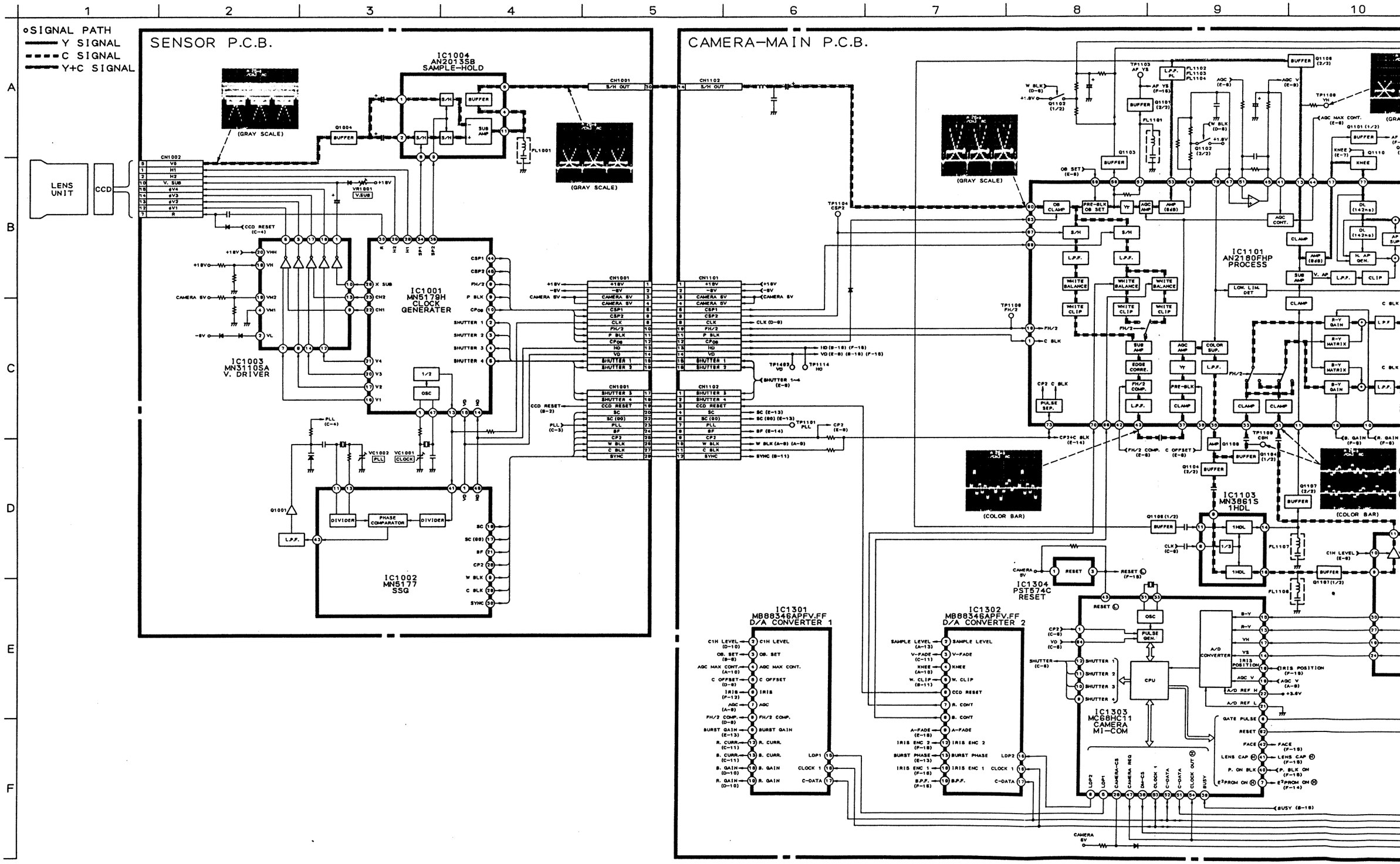

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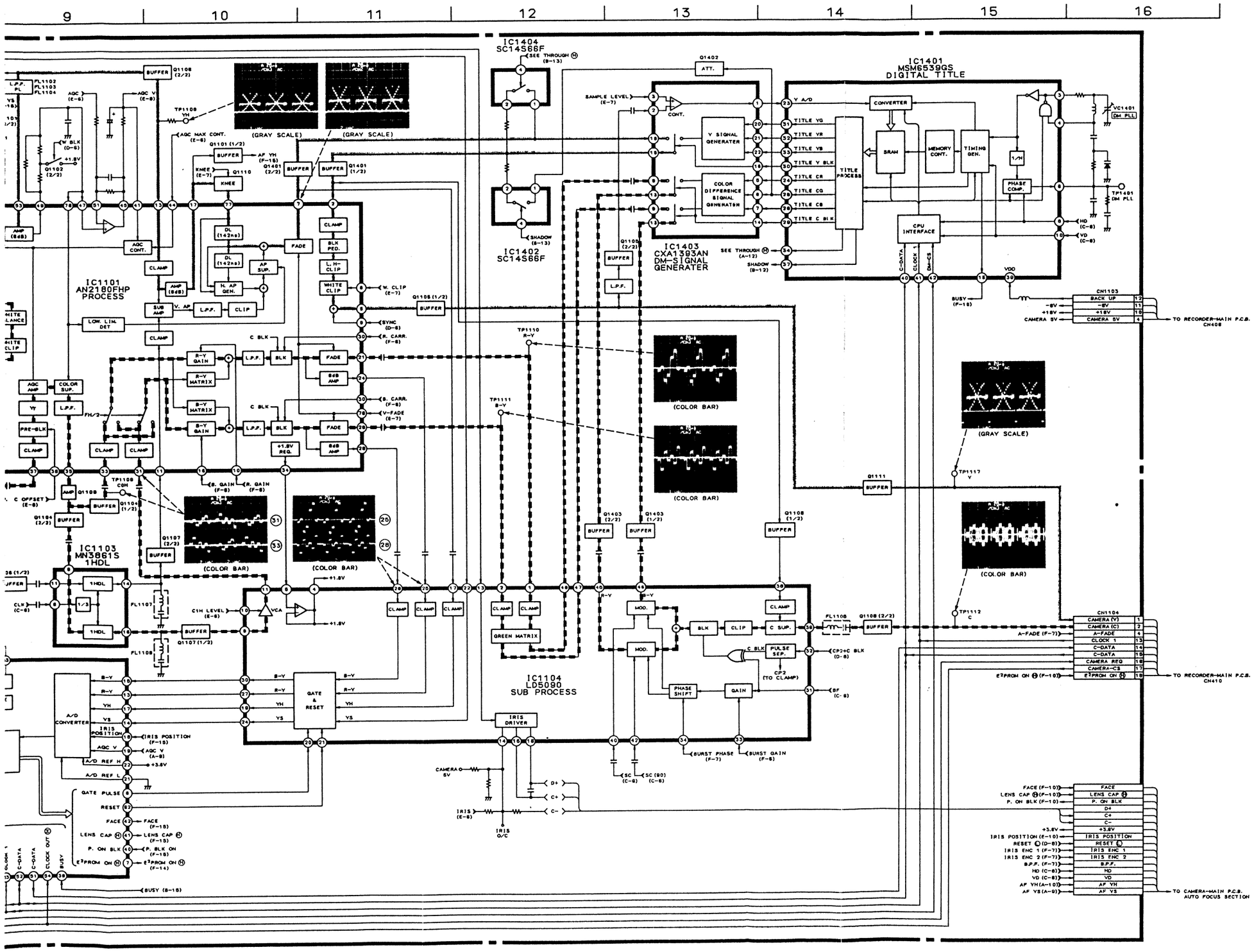

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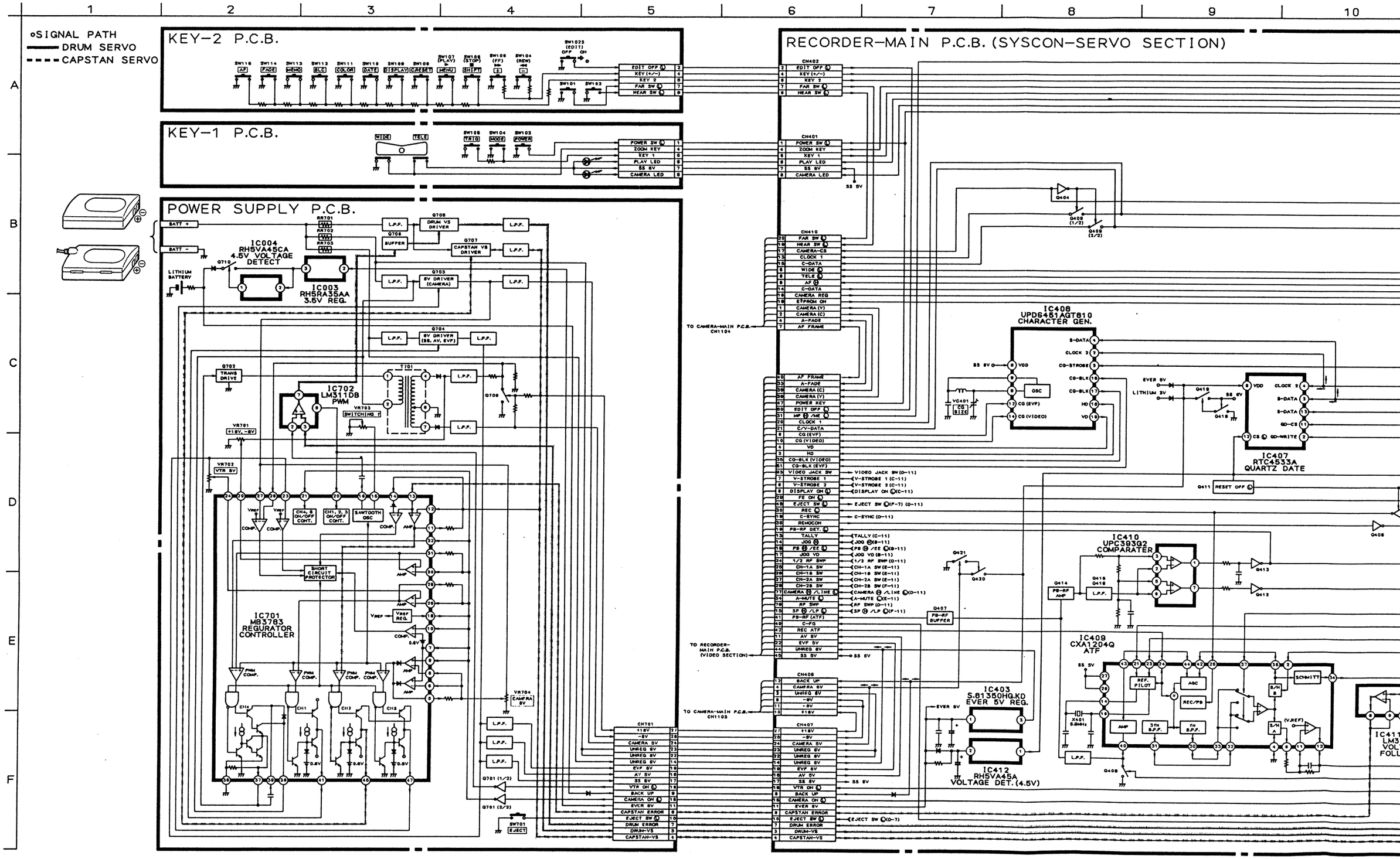

9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17

SECTION)

IC407
RTC4533A
QUARTZ DATE

IC406
CXP80724-652N
MAIN MI-COM

IC411 (1/2)
LM324DB
AMP

IC411 (2/2)
LM324DB
VOLTAGE
FOLLOWER

IC404 (2/2)
CXA1512M
WAVE SHAPER

IC404 (1/2)
CXA1512M
WAVE SHAPER

IC401
MPC1720
LOADING MOTOR DRIVE

IC402
CXA1127M
DRUM MOTOR DRIVE

IC405
CXA1127AM
CAPSTAN MOTOR DRIVE

LOADING MOTOR

DRUM MOTOR

CAPSTAN MOTOR

MODE SWITCH

DEW SENSOR

T. FG

S. FG

BOT SENSOR

EOT SENSOR

CASSETTE DOWN SW

SAFETY TAB

HE / MP

	LOAD	UN-LOAD
OFF	L	L
LOADING	H	L
UN-LOADING	L	H
BLANK	H	H

ATF PILOT	f1	f2	f3	f4
SEL 1	H	L	H	L
SEL 2	H	H	L	L

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BLOCK DIAGRAM AUDIO-VIDEO SECTION

1 2 3 4 5 6 7 8

A B C D E

oSIGNAL PATH
REC SIGNAL
PB SIGNAL

RECORDER-MAIN P.C.B. (VIDEO SECTION)

TO RECORDER-MAIN P.C.B. (SYSCON-SERVO SECTION)

CN101: AV 5V, CH-1A SW, CH-1B SW, CH-2A SW, CH-2B SW, UNREG 6V, PB-RF DET., CAMERA (Y), PB Ⓑ /EE, CLOCK 1, CAMERA Ⓑ /LINE, JOG Ⓑ, CG (VIDEO), CG-BLK (VIDEO), RF SWP, REC, CG (EVF), FE ON, AF FRAME, EDIT OFF, SP Ⓑ /LP, V-STROBE 1, V-STROBE 2, CG-BLK (EVF), DISPLAY ON, C/V DATA, A-MUTE, C-SYNC, MF Ⓑ /MF, JOG VD, REC ATF, CAMERA (C), VIDEO JACK SW, AI MODE ON, 8S 5V, TALLY, A-FADE, 1/2 RF SWP, PB-RF (ATF), C-FG, POWER SW, EJECT SW, EVF 5V, VD, HD

CN102: EJECT SW, POWER SW, C-FG, PB-RF, 1/2 SWP, HEAD SW PULSE

IC101 SC7C32F CG/AF FRAME MIX

IC105 LD5088 Y/C PROCESS

IC107 CXA1205N SEQ. COMP.

IC802 SC14S66F AUDIO OUT ON

IC801 CXA1237AR AUDIO-FM

IC102 TK11447 CURRENT LIMITER

FL111 120ns DELAY

FL101 4.43MHz B.P.F.

FL106 743KHz B.P.F.

FL801 1.5MHz B.P.F.

EVF P.C.B.

CN2806: H+, H-, V+, V-

IC2901 BA7149F

CN2801: K, G1, H

T2801

T2816 HD

JACK P.C.B.

JC002

IC001 (1/2) AMP 30Hz B.P.F.

IC001 (2/2) AMP B.P.F.

CN002: MIC, BIAS

CN801: A-MUTE, MIC-AUDIO, A-FADE, TALLY, 8S 5V, REMOCON, VIDEO OUT, VIDEO JACK SW, AUDIO OUT, RF 5V, AV 5V

JC001: VIDEO OUT, AUDIO OUT

EXT. MIC

RECEIVER UNIT

5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13

MAIN P.C.B. (VIDEO SECTION)

IC101
SC7C32F
CG/AF FRAME MIX

IC105
LD5089
Y/C PROCESS

IC107
CXA1203N
SEQ. COMP.

IC103
CXL1502M
CCD COMB FILTER

IC104
CXA1200BQ
Y/C PROCESS

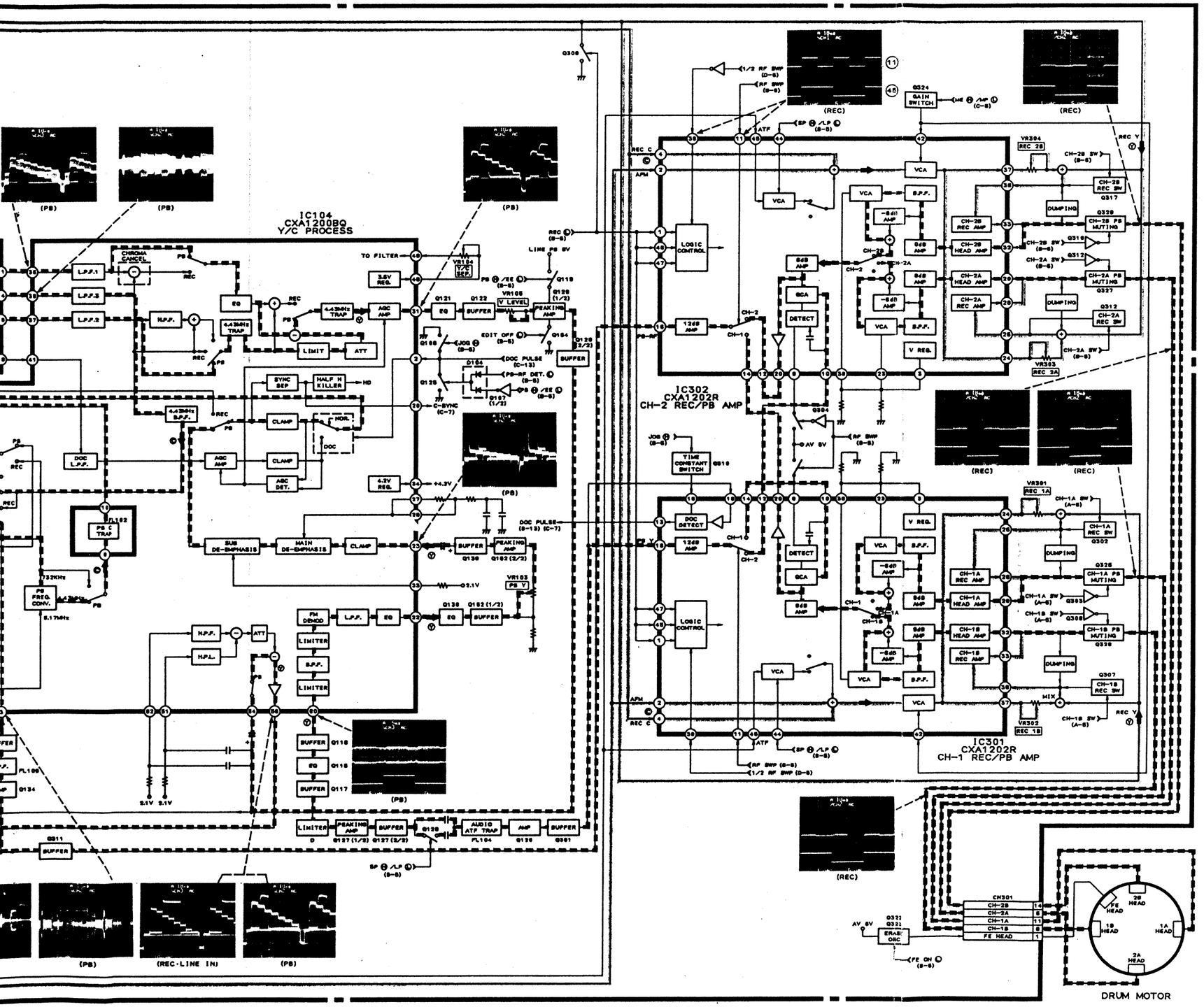
IC601
CXA1237AR
AUDIO-FM

IC102
TK11447
CURRENT LIMITER

(PB)

(REC)

(REC·LINE IN)



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CIRCUIT BOARD DIAGRAM CAMERA-MAIN P.C.B.

CAMERA–MAIN P.C.B.(COMPONENT SIDE)

< NOTICE >

CAMERA-MAIN P.C.B. consists of four layers.
(Soldering, Component, Power Supply and Ground patterns.)

※ Through-hole marks on each P. C. B. denote :

○ : Soldering side ⟷ Component side

Ⓖ : Soldering side (Component side) ⟷ Ground

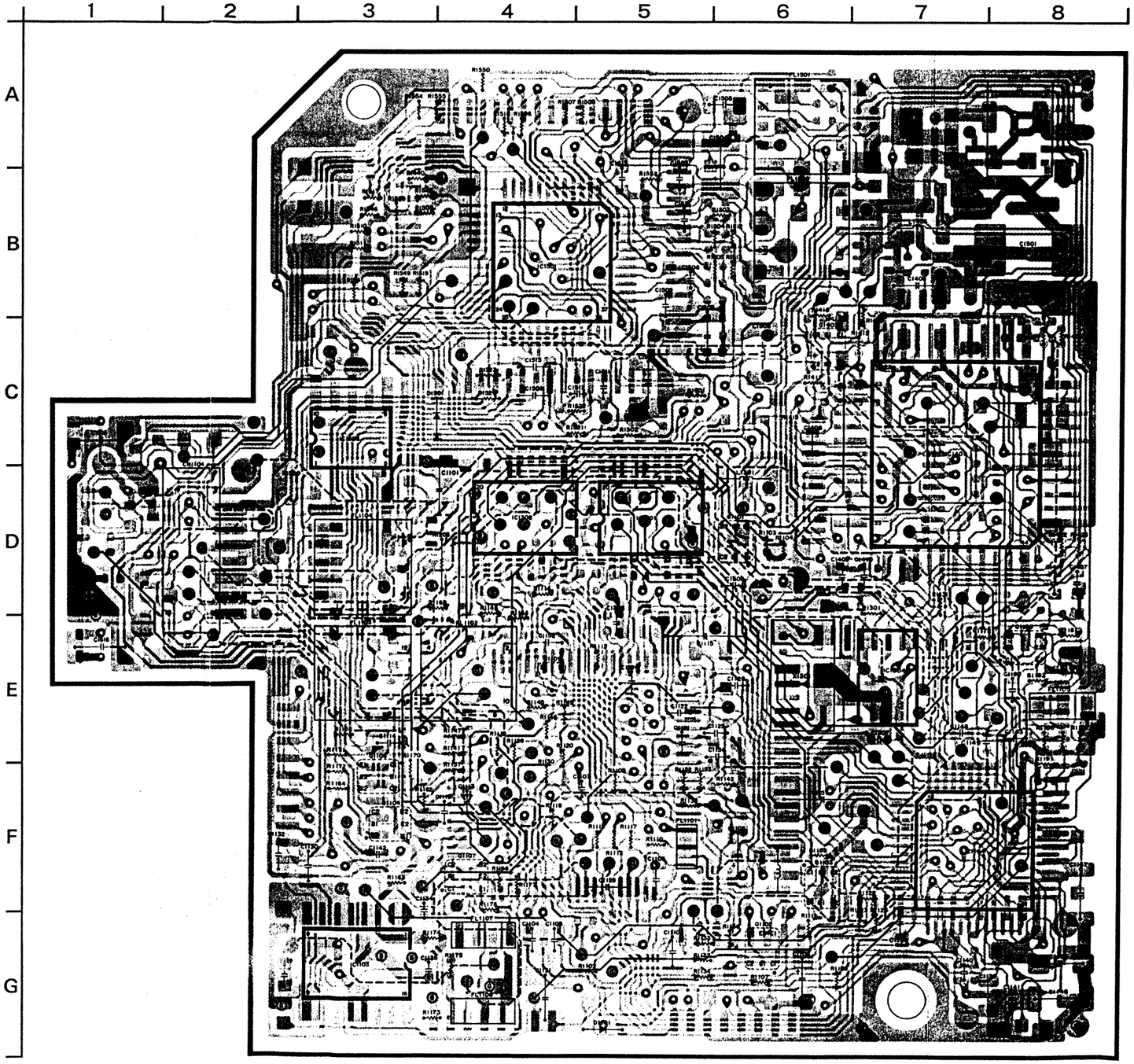
Ⓑ : Soldering side (Component side) ⟷ Power Supply

And, blue lines denote signal patterns which connected in the Ground or Power Supply layer.

Blue (————) : Power Supply layer

Blue (– – – –) : Ground layer

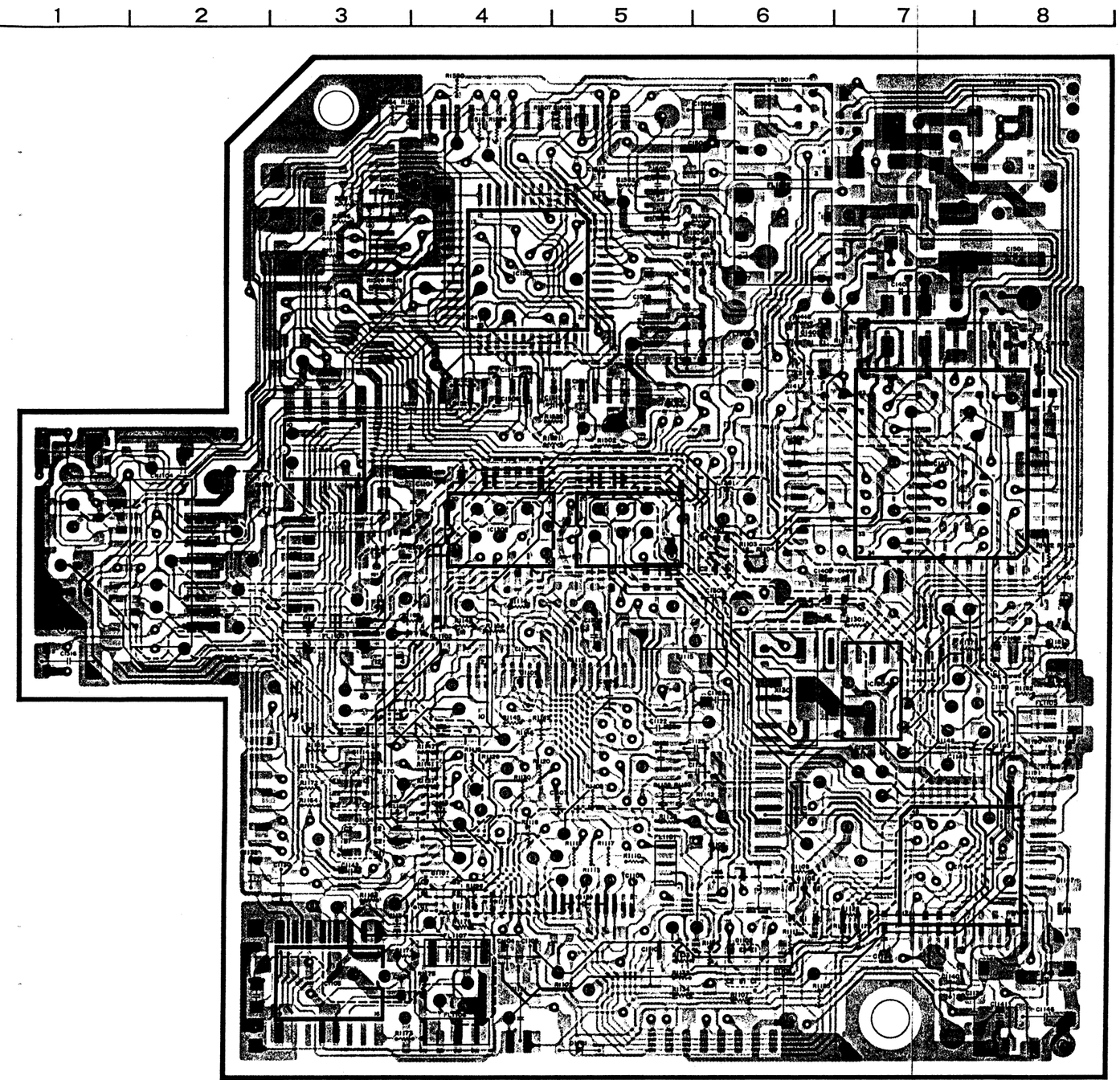
D1101	G–5
D1501	C–3
IC1103	G–3
IC1104	F–7
IC1301	D–5
IC1302	D–4
IC1304	E–7
IC1401	C–7
IC1501	B–4
IC1503	C–3
Q1101	D–6
Q1102	G–6
Q1103	F–6
Q1104	F–3
Q1106	F–3
Q1107	F–4
Q1108	E–8
Q1109	E–4
Q1402	C–6



CA

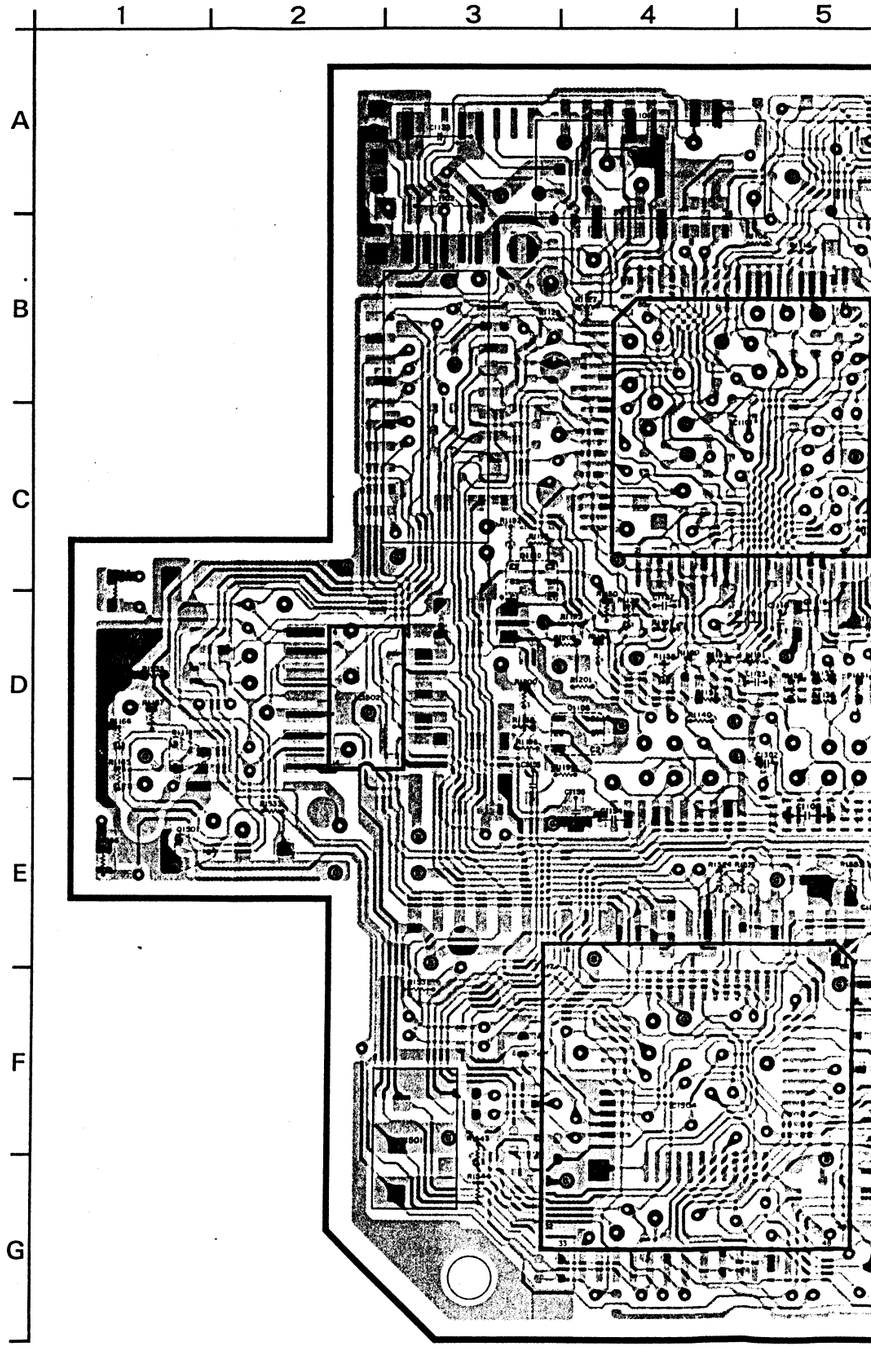
N P.C.B.

P.C.B.(COMPONENT SIDE)

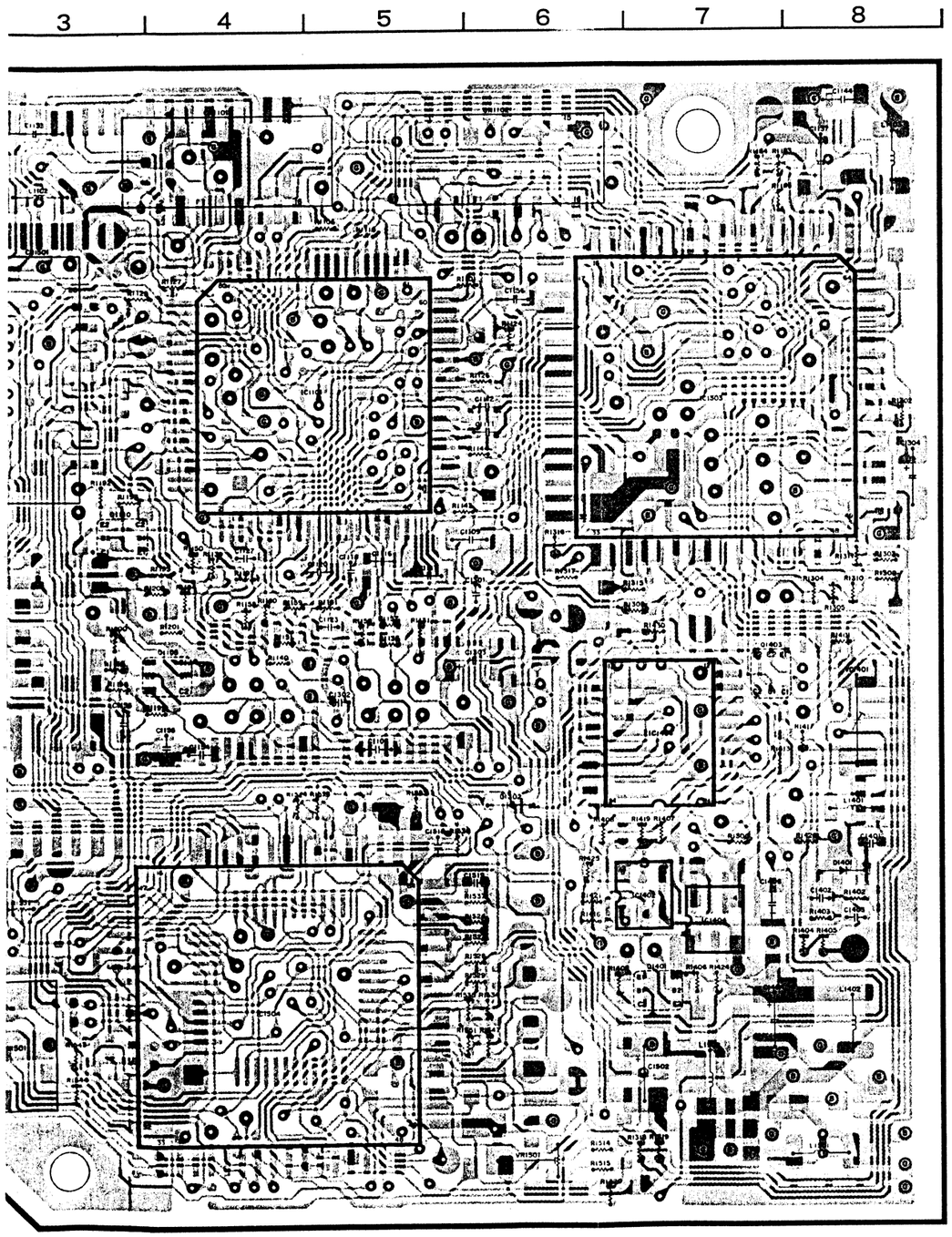


CAMERA-MAIN P.C.B.(SOLDERING SIDE)

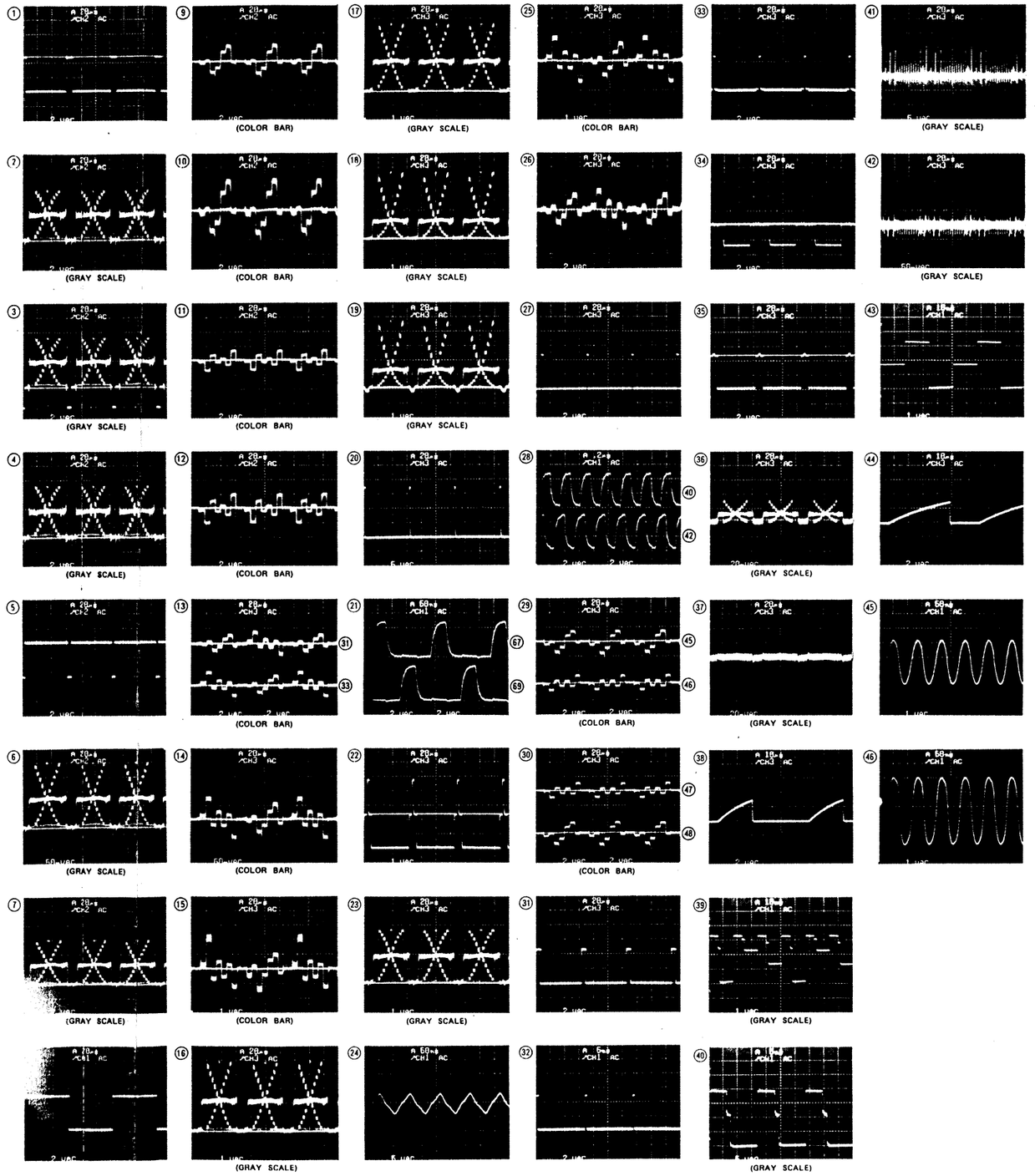
D1302	E-6
D1401	E-8
IC1101	C-5
IC1303	C-7
IC1402	F-7
IC1403	E-7
IC1404	F-7
IC1502	D-2
IC1504	F-4
Q1105	D-4
Q1110	C-3
Q1111	D-1
Q1401	F-7
Q1403	D-7
Q1501	E-1
VC1401	E-8
VR1501	G-6



a SIDE)



SIGNAL WAVEFORMS



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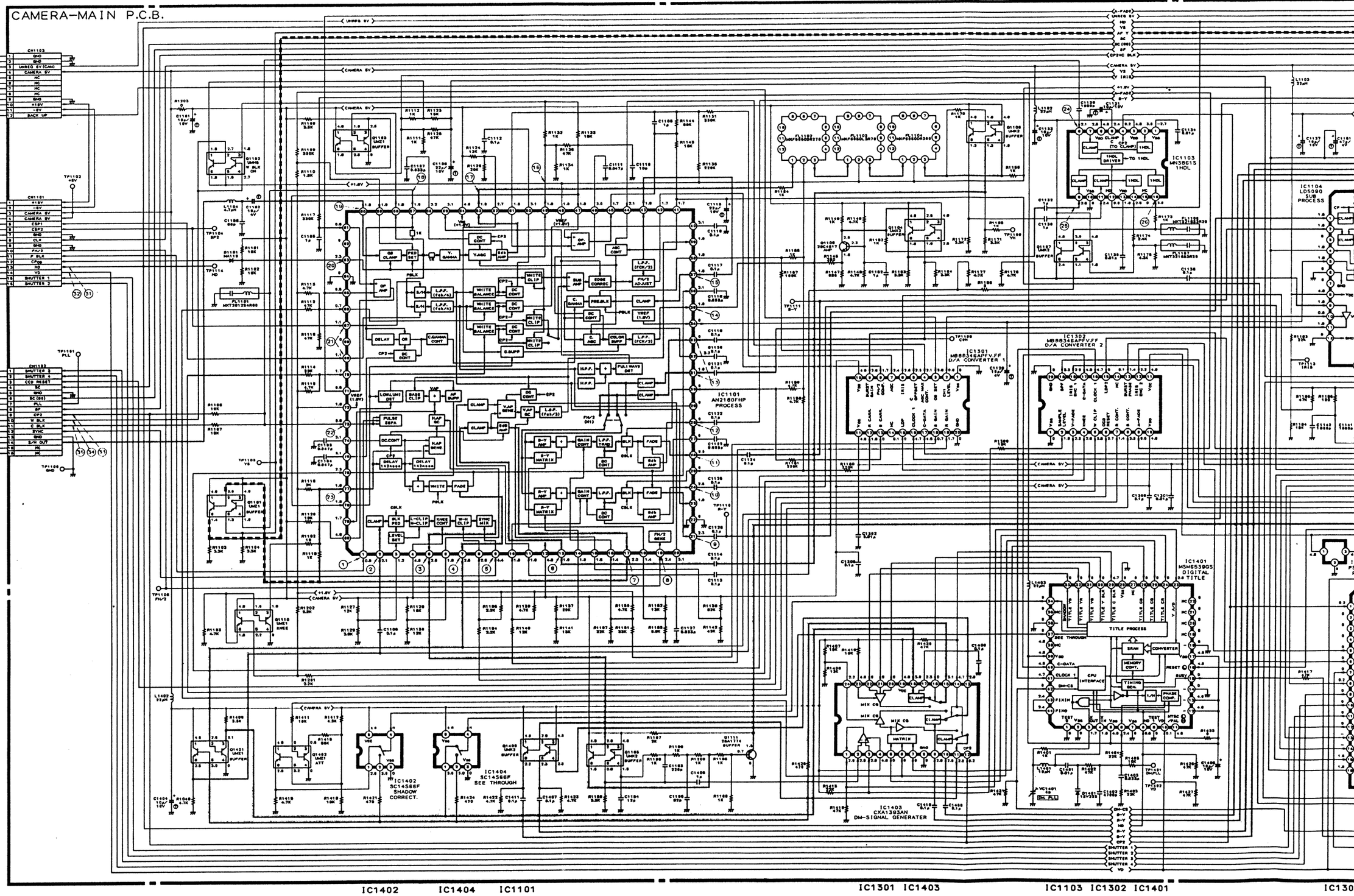
SCHEMATIC DIAGRAM CAMERA-MAIN P.C.B.

oSIGNAL PATH Y+C SIGNAL (GRAY) ——— Y SIGNAL (BLUE) - - - - ES·CU SIGNAL (BLUE)



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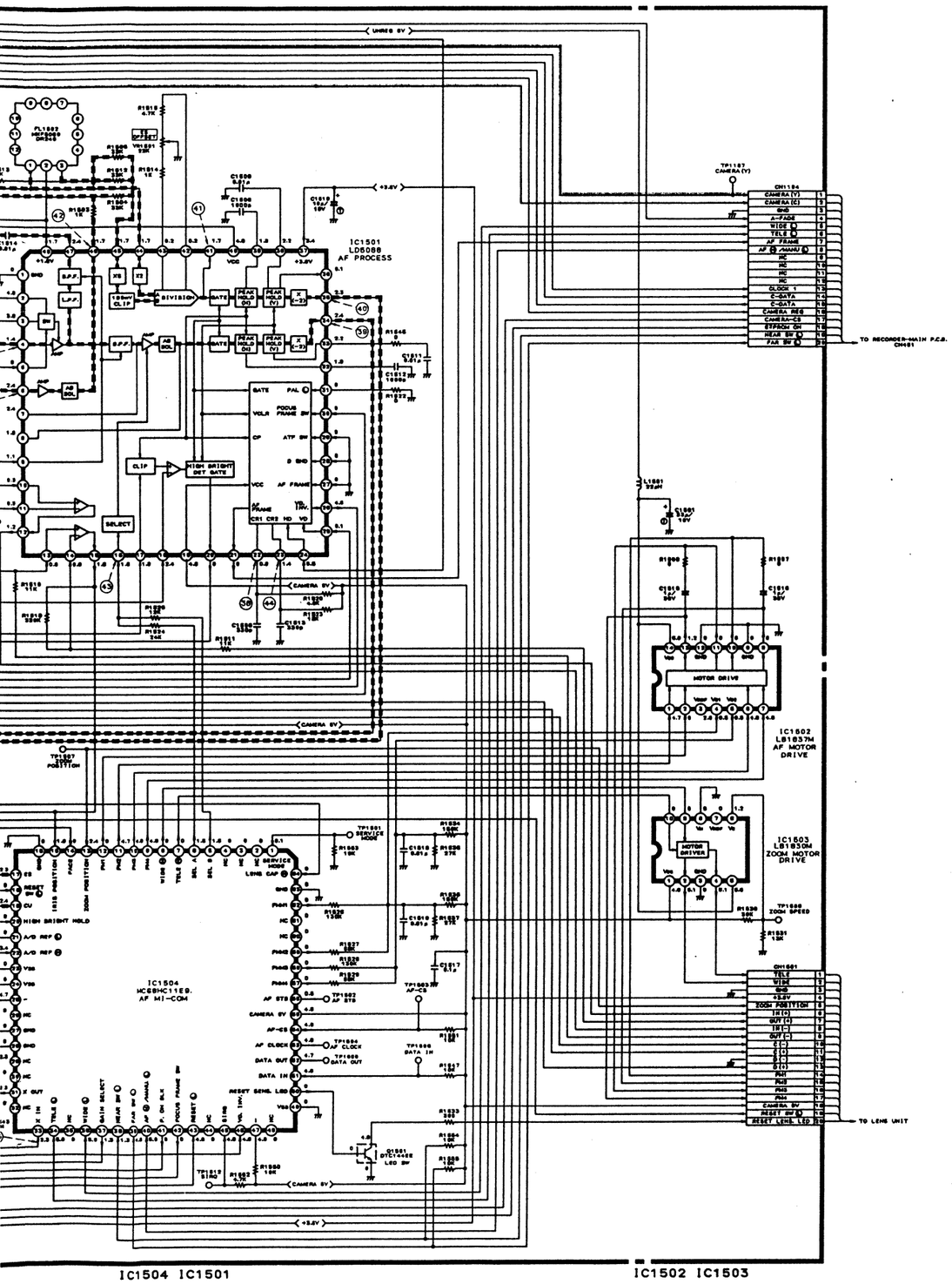
SIGNAL PATH — Y+C SIGNAL (GRAY) — Y SIGNAL (BLUE) - - - - ES·CU SIGNAL (BLUE) ····· C SIGNAL (ORANGE)

IC1301 IC1403 IC1103 IC1302 IC1401 IC1304 IC1104 IC1303 IC1504 IC1501 IC1502 IC1503



IC1504 IC1501 IC1502 IC1503

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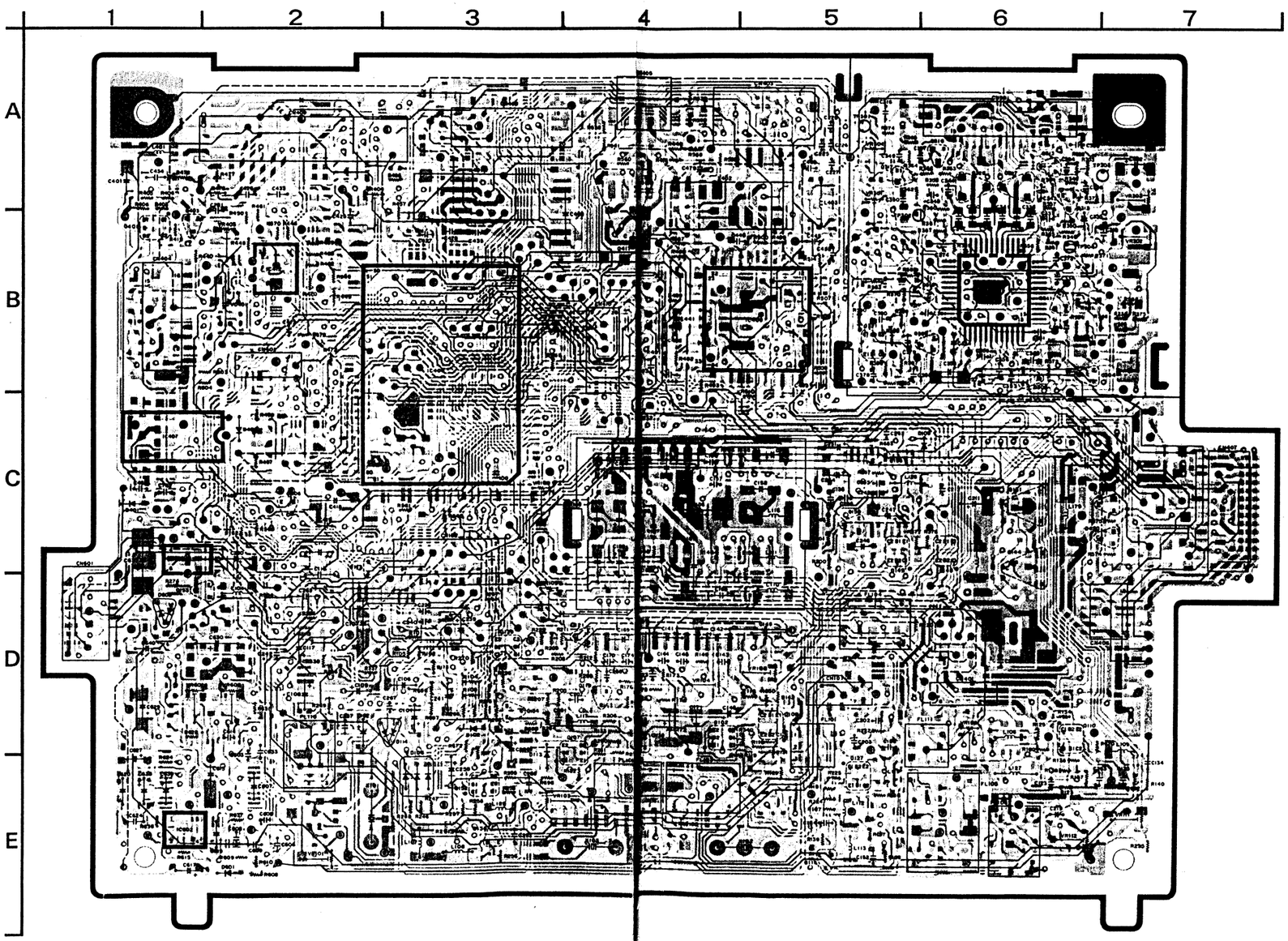
CIRCUIT BOARD DIAGRAM RECORDER-MAIN・POWER SUPPLY P.C.B.

< NOTICE >
RECORDER-MAIN P.C.B. consists of four layers.
(Soldering, Component, Power Supply and Ground patte
※ Through-hole marks on each P. C. B. denote :
○ : Soldering side ⟷ Component side
Ⓖ : Soldering side (Component side) ⟷ Ground
Ⓑ : Soldering side (Component side) ⟷ Power Supply
And, blue lines denote signal patterns which connected i
Ground or Power Supply layer.
Blue (———) : Power Supply layer
Blue (– – – –) : Ground layer

RECORDER-MAIN P.C.B. (COMPONENT SIDE)

D102	D-3
D106	E-3
D109	C-6
D113	E-3
D114	D-3
D401	C-1
D404	C-2
D601	E-2
D603	D-1
IC102	C-1
IC302	B-6
IC406	B-3
IC407	C-1
IC409	B-5
IC412	B-2
IC602	E-1
Q102	D-4
Q107	D-4
Q109	D-5
Q110	D-6
Q113	C-2
Q116	E-5
Q119	D-4
Q121	D-4
Q127	E-5
Q129	D-3
Q131	C-6
Q138	E-3
Q144	C-6
Q148	C-6
Q149	C-5
Q152	E-3
Q153	D-1
Q154	D-3
Q155	C-5
Q156	C-5
Q159	D-4
Q304	B-6
Q305	B-6
Q309	B-6
Q311	B-6
Q312	A-6
Q313	A-6
Q316	A-6
Q317	A-5
Q318	B-6
Q321	B-5
Q327	A-6
Q328	A-6
Q401	B-1
Q403	B-1
Q406	C-2
Q417	B-4
Q420	C-7
Q421	C-7
VC401	B-2
VR101	E-2
VR102	D-6
VR103	E-3
VR104	D-4
VR105	D-3
VR108	D-5
VR109	C-3
VR111	E-7
VR112	E-6
VR301	A-5
VR302	B-7
VR303	A-7
VR304	A-5
VR403	B-2
VR404	A-2
VR601	D-1
VR602	D-2



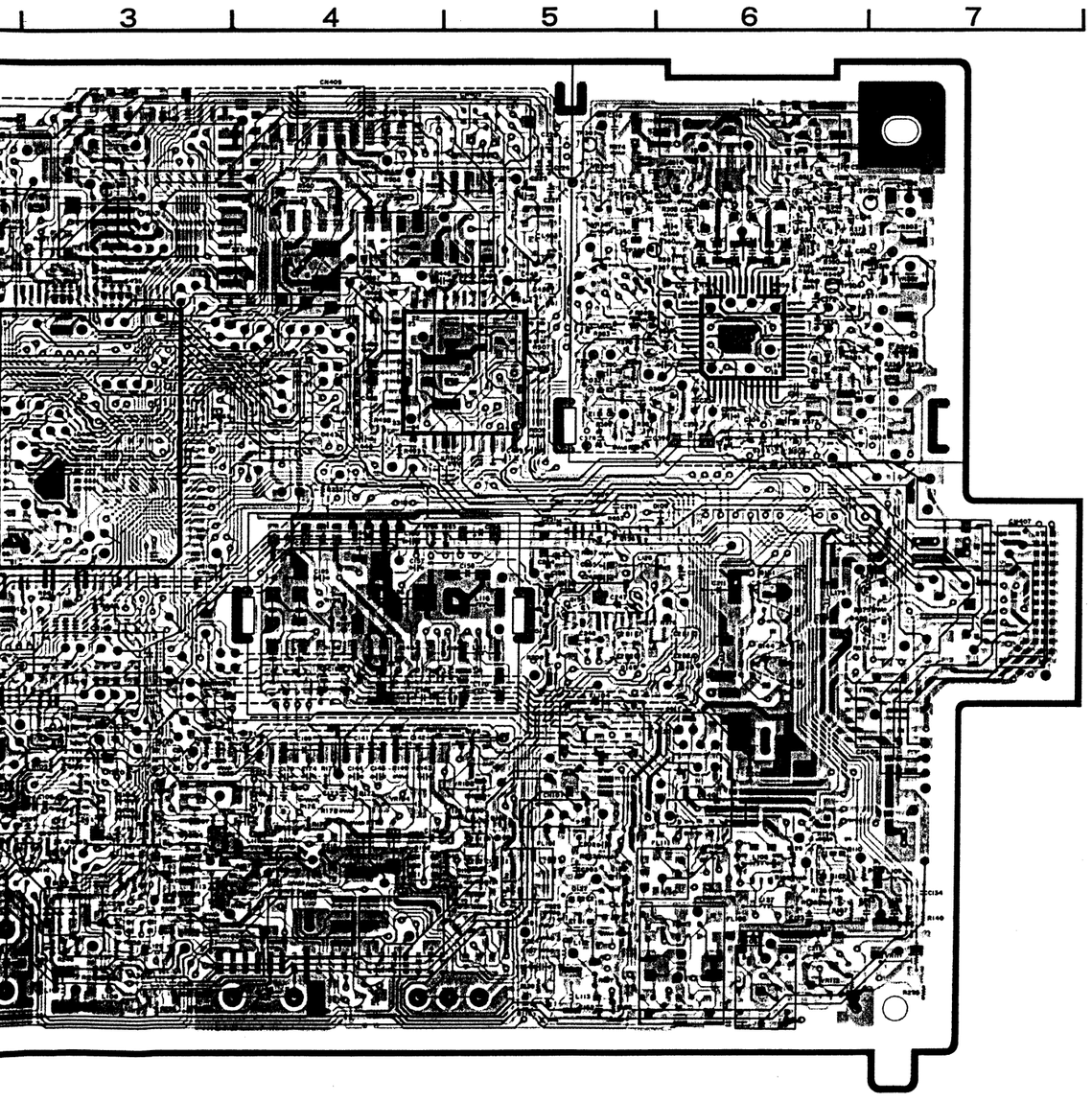
RECORDER-MAIN P.C

D101	C-6
D103	B-5
D104	A-5
D107	C-3
D110	C-3
D112	C-3
D402	C-7
D403	C-2
D405	C-7
D406	D-4
D602	A-1
IC101	B-2
IC103	C-4
IC104	B-4
IC105	B-2
IC107	C-5
IC301	D-6
IC401	E-4
IC402	E-3
IC403	C-2
IC404	D-3
IC405	E-2
IC408	C-2
IC410	E-5
IC411	D-3
IC601	A-2
Q101	A-2
Q103	B-6
Q105	B-6
Q108	A-5
Q115	A-5
Q117	A-5
Q122	B-3
Q125	B-5
Q126	B-5
Q128	B-5
Q132	C-6
Q133	C-2
Q134	A-6
Q135	A-6
Q137	A-6
Q139	A-3
Q140	E-5
Q141	E-5
Q145	C-6
Q146	C-6
Q147	A-6
Q151	C-2
Q157	C-7
Q158	B-6
Q301	D-5
Q302	E-5
Q303	E-6
Q306	E-6
Q307	D-6
Q310	D-5
Q314	D-6
Q320	D-5
Q322	E-6
Q323	E-6
Q324	D-6
Q325	E-6
Q326	E-6
Q402	D-1
Q404	D-4
Q407	D-5
Q408	D-5
Q409	D-3
Q410	D-3
Q411	D-4
Q412	D-4
Q413	E-4
Q414	D-5
Q415	E-5
Q416	E-5
Q418	D-1
Q419	D-1
Q601	B-1
Q602	B-2
Q603	B-1

ER-MAIN • POWER SUPPLY P.C.B.

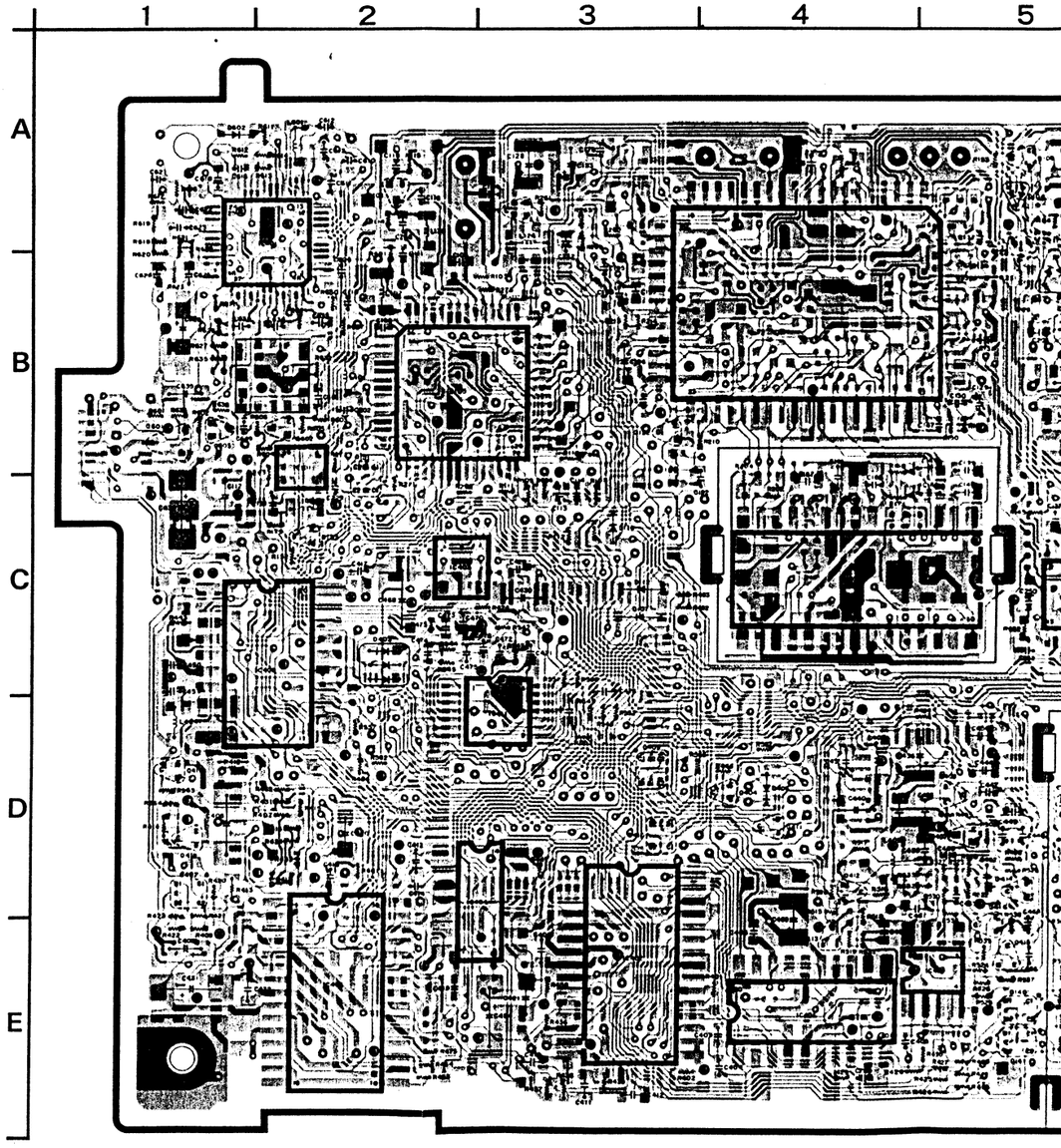
< NOTICE >
RECORDER-MAIN P.C.B. consists of four layers.
(Soldering, Component, Power Supply and Ground patterns.)
※ Through-hole marks on each P. C. B. denote :
○ : Soldering side ⟷ Component side
Ⓖ : Soldering side (Component side) ⟷ Ground
Ⓑ : Soldering side (Component side) ⟷ Power Supply
And, blue lines denote signal patterns which connected in the Ground or Power Supply layer.
Blue (————) : Power Supply layer
Blue (– – – –) : Ground layer

IDE)

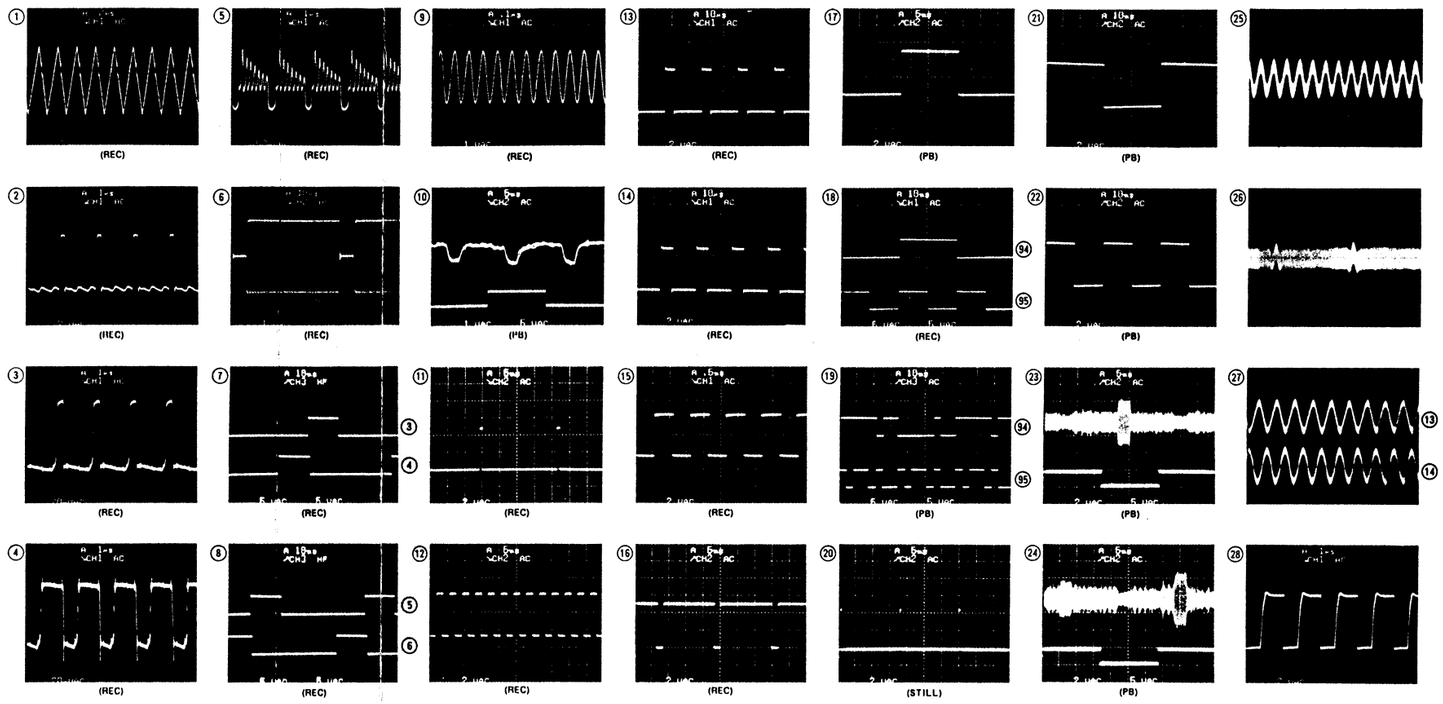


RECORDER-MAIN P.C.B. (SOLDERING SIDE)

D101	C-6
D103	B-5
D104	A-5
D107	C-3
D110	C-3
D112	C-3
D402	C-7
D403	C-2
D405	C-7
D406	D-4
D602	A-1
IC101	B-2
IC103	C-4
IC104	B-4
IC105	B-2
IC107	C-5
IC301	D-6
IC401	E-4
IC402	E-3
IC403	C-2
IC404	D-3
IC405	E-2
IC408	C-2
IC410	E-5
IC411	D-3
IC601	A-2
Q101	A-2
Q103	B-6
Q105	B-6
Q108	A-5
Q115	A-5
Q117	A-5
Q122	B-3
Q125	B-5
Q126	B-5
Q128	B-5
Q132	C-6
Q133	C-2
Q134	A-6
Q135	A-6
Q137	A-6
Q139	A-3
Q140	E-5
Q141	E-5
Q145	C-6
Q146	C-6
Q147	A-6
Q151	C-2
Q157	C-7
Q158	B-6
Q301	D-5
Q302	E-5
Q303	E-6
Q306	E-6
Q307	D-6
Q310	D-5
Q314	D-6
Q320	D-5
Q322	E-6
Q323	E-6
Q324	D-6
Q325	E-6
Q326	E-6
Q402	D-1
Q404	D-4
Q407	D-5
Q408	D-5
Q409	D-3
Q410	D-3
Q411	D-4
Q412	D-4
Q413	E-4
Q414	D-5
Q415	E-5
Q416	E-5
Q418	D-1
Q419	D-1
Q601	B-1
Q602	B-2
Q603	B-1

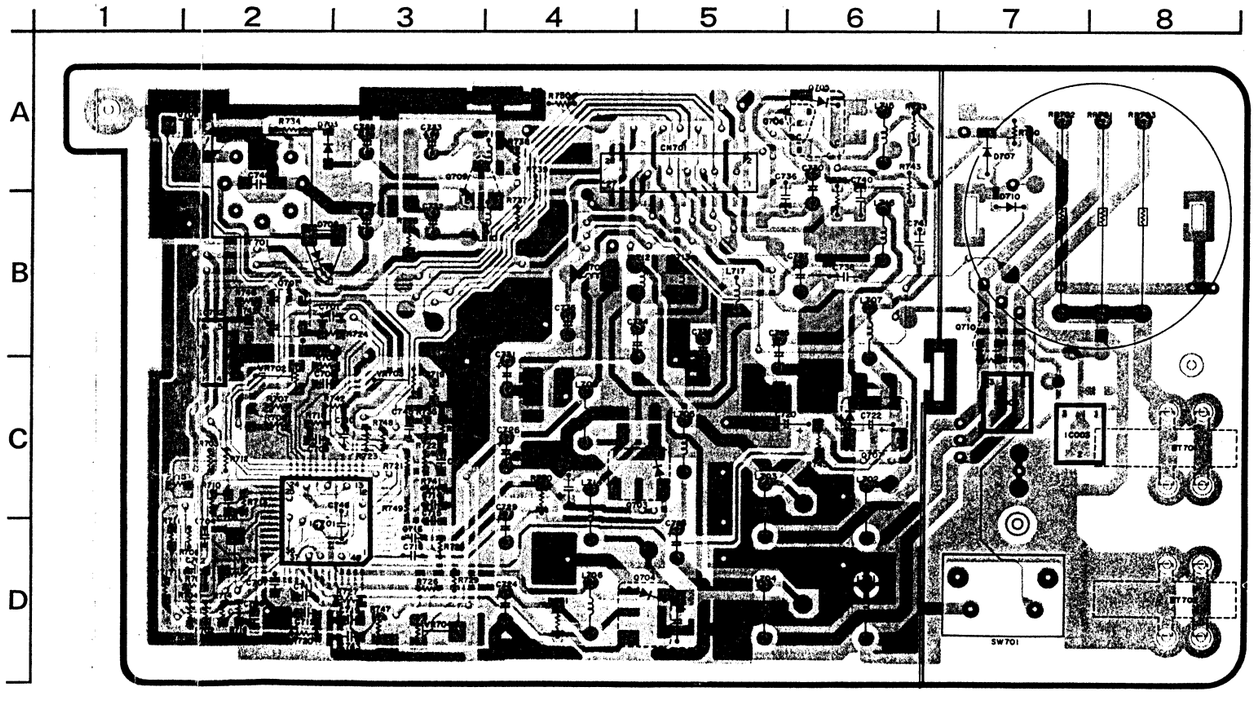


SIGNAL WAVEFORMS



POWER SUPPLY P.C.B.

D702	B-2
D703	A-2
D707	A-7
D710	B-7
IC003	C-7
IC004	C-7
IC701	D-2
IC702	B-2
Q701	B-2
Q702	A-2
Q703	C-5
Q704	D-4
Q705	A-6
Q706	A-6
Q707	C-6
Q709	B-3
Q710	B-7



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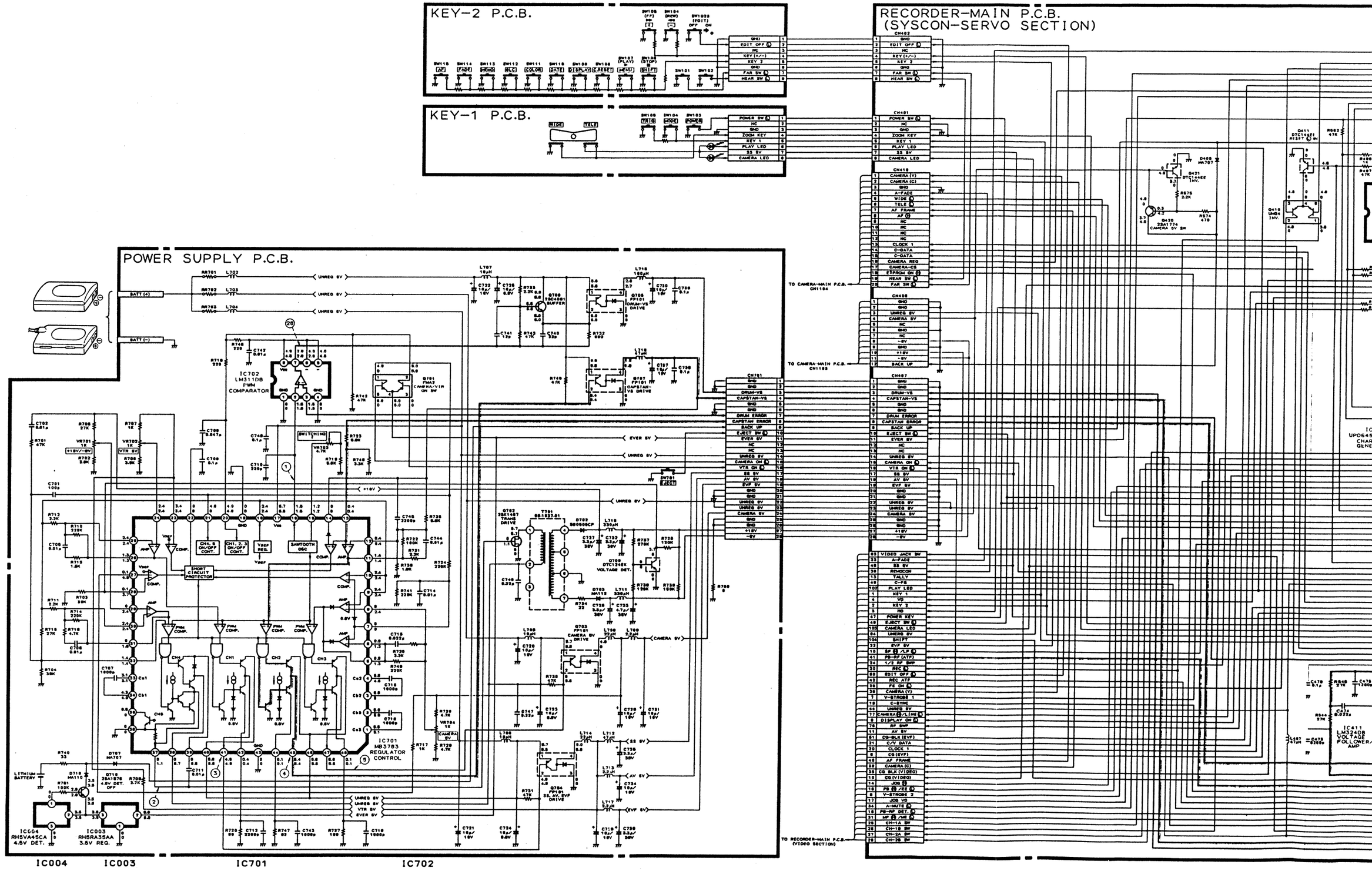
SCHEMATIC DIAGRAM RECORDER-MAIN P.C.B. (SYSCON-SERVO SECTION)

◦SIGNAL PATH



IC004 IC003 IC701 IC702

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SECTION)

○SIGNAL PATH — CAPSTAN PWM (BLUE) / CAPSTAN FG (BLUE) / CAPSTAN ATF (BLUE) — DRUM PWM (ORANGE) / DRUM FG (ORANGE) / DRUM PG (ORANGE)

RECORDER-MAIN P.C.B.
(SYSCON-SERVO SECTION)

CN402: GND, EDIT OFF, NC, KEY(+/-), KEY 2, GND, FAN SW, REAR SW

CN401: POWER SW, NC, GND, ZOOM KEY, KEY 1, PLAY LED, 5S 5V, CAMERA LED

CN418: CAMERA (Y), CAMERA (C), GND, A-FADE, WIDE, TELE, AF FRAME, AF, NC, NC, NC, NC, CLOCK 1, C-DATA, E-DATA, CAMERA REQ, CAMERA-CS, E²PROM ON, REAR SW, FAN SW

CN408: GND, GND, UNREG 8V, CAMERA 8V, NC, GND, NC, GND, +18V, -8V, GND, BACK UP

CN407: GND, GND, DRUM-VS, CAPSTAN-VS, GND, GND, DRUM ERROR, CAPSTAN ERROR, BACK UP, EJECT SW, EVER 5V, NC, NC, UNREG 8V, CAMERA ON, VTR ON, 5S 5V, AV 5V, EVF 5V, GND, GND, UNREG 8V, UNREG 8V, CAMERA 8V, GND, GND, +18V, -8V

63	VIDEO JACK SW
53	A-FADE
48	5S 5V
58	REMOCON
13	TALLY
49	C-PB
102	PLAY LED
1	KEY 1
4	VD
7	KEY 2
3	HD
47	POWER KEY
46	EJECT SW
103	CAMERA LED
84	UNREG 8V
104	SHIFT
22	EVF 5V
18	SP/LP
41	PB-RF (ATF)
24	1/2 RF SWP
30	REC
80	EDIT OFF
42	REC ATF
28	FE ON
19	CAMERA (Y)
7	V-STROBE 1
19	C-SYNC
44	UNREG 8V
17	CAMERA/LINE
9	DISPLAY ON
76	RF SWP
11	AV 5V
51	CG-BLK (EVF)
21	C/V DATA
20	CLOCK 1
8	CG (EVF)
40	AF FRAME
39	CAMERA (C)
35	CG BLK (VIDEO)
10	CG (VIDEO)
14	JOG
15	PB/VEE
5	V-STROBE 2
17	JOG VD
36	A-MUTE
16	PB-RF DET.
31	MP/ME
38	CH-1A SW
39	CH-1B SW
21	CH-2A SW
20	CH-2B SW

IC407 RTC4553A QUARTZ DATE

IC408 UPD6451AGT-810 CHARACTER GENERATOR

IC411 LM324DB VOLTAGE FOLLOWER/AMP

IC406 CXP80724.652N MAIN MI-COM

IC412 RH5VA45A VOLTAGE DET.(4.5V)

IC403 S-81350HG-KD EVER 5V REG.

IC409 CXA1204Q ATF

IC410 μPC393G2 COMPARATOR

Q411 DTC144EE RESET 5V SW; Q421 DTC144EE INV.; Q430 2SA1774 CAMERA 8V SW; Q408 2SA1774 INV.; Q418 DTC144EE 5S 5V SW; Q410 UMG4 INV.; Q404 DTA144EE INV.; Q409 UMG4 CLOCK/DATA SW; Q412 2SA1774 SP/LP DET.; Q414 2SC4617 PB-RF AMP; Q413 2SC4617 RF DET.; Q408 DTC144EE OFFSET SW; Q431 2SA1774 BUFFER

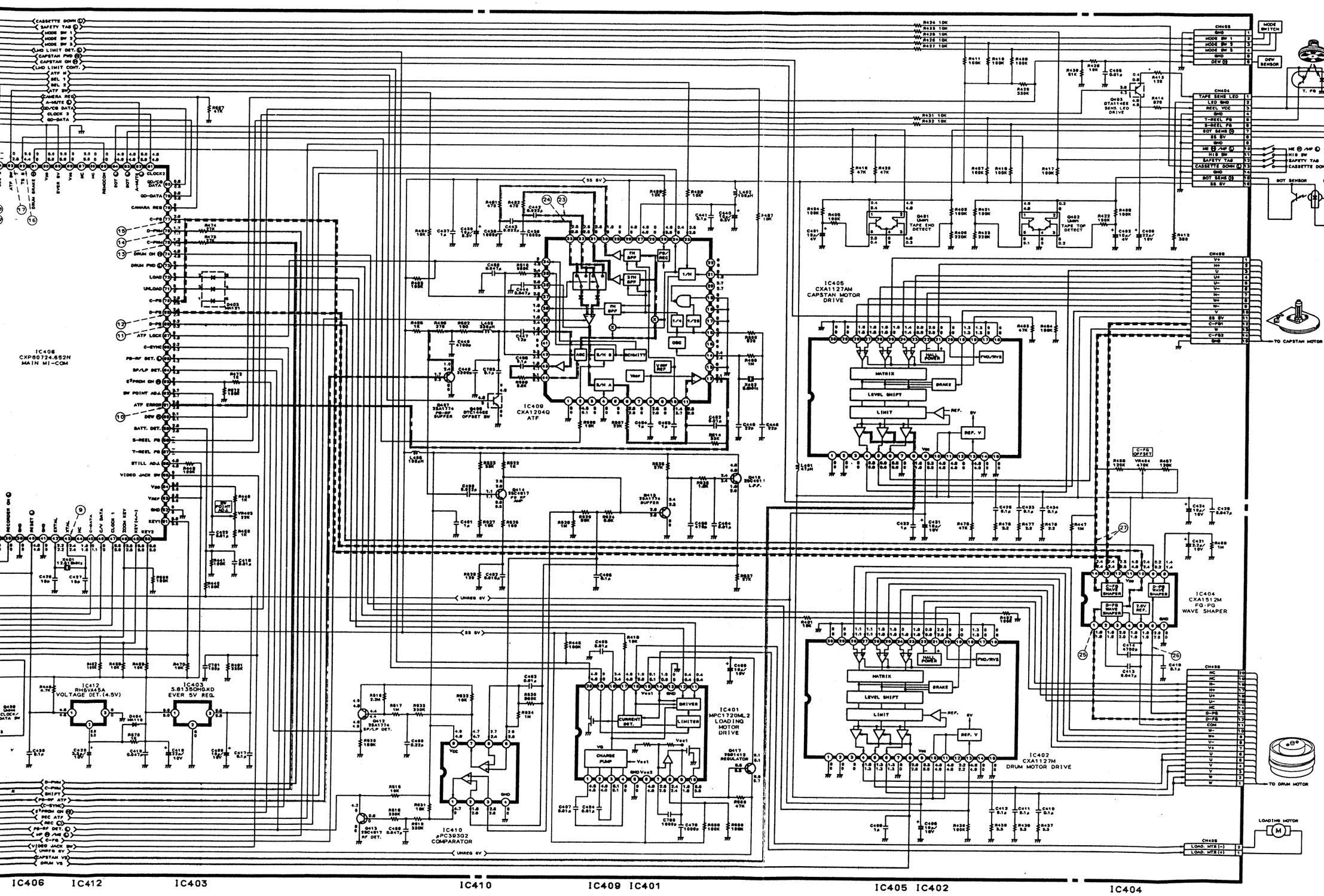
D402 MA707; D481 MA110; D403 MA121; D408 MA116; D404 MA111

X401 12.5MHz; VC401 32kHz; L401 33μH; L507 47μH; L406 100μH

SW POINT ADJ.

EVER 5V; UNREG 8V; 5S 5V

IC407 IC408 IC411 IC406 IC412 IC403 IC410 IC



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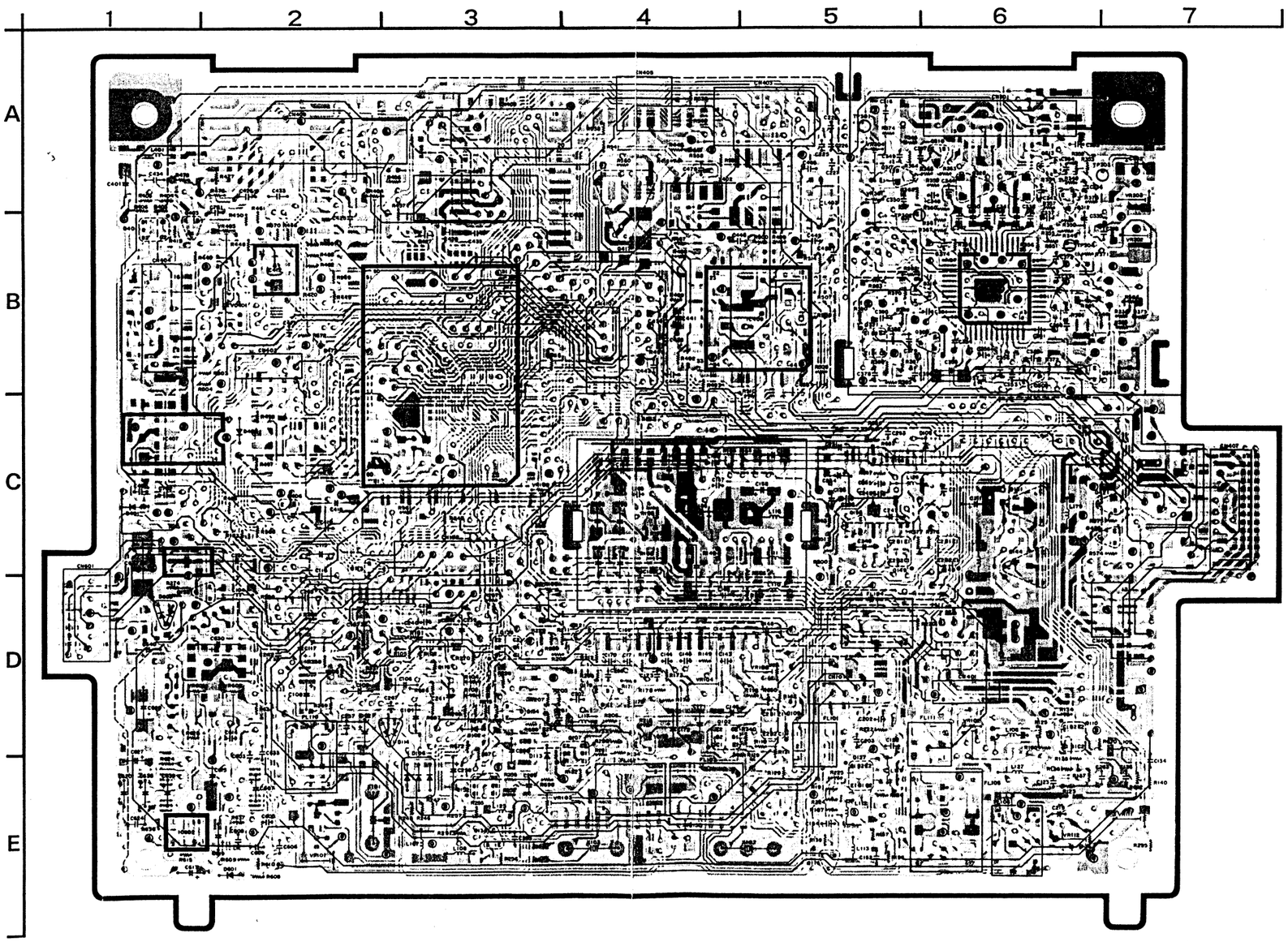
CIRCUIT BOARD DIAGRAM RECORDER-MAIN P.C.B.

< NOTICE >
RECORDER-MAIN P.C.B. consists of four layers.
(Soldering, Component, Power Supply and Ground patter
※ Through-hole marks on each P. C. B. denote :
○ : Soldering side ⟷ Component side
Ⓖ : Soldering side (Component side) ⟷ Ground
Ⓑ : Soldering side (Component side) ⟷ Power Supply
And, blue lines denote signal patterns which connected in
Ground or Power Supply layer.
Blue (———) : Power Supply layer
Blue (– – – –) : Ground layer

RECORDER-MAIN P.C.B. (COMPONENT SIDE)



D102	D-3
D106	E-3
D109	C-6
D113	E-3
D114	D-3
D401	C-1
D404	C-2
D601	E-2
D603	D-1
IC102	C-1
IC302	B-6
IC406	B-3
IC407	C-1
IC409	B-5
IC412	B-2
IC602	E-1
Q102	D-4
Q107	D-4
Q109	D-5
Q110	D-6
Q113	C-2
Q116	E-5
Q119	D-4
Q121	D-4
Q127	E-5
Q129	D-3
Q131	C-6
Q138	E-3
Q144	C-6
Q148	C-6
Q149	C-5
Q152	E-3
Q153	D-1
Q154	D-3
Q155	C-5
Q156	C-5
Q159	D-4
Q304	B-6
Q305	B-6
Q309	B-6
Q311	B-6
Q312	A-6
Q313	A-6
Q316	A-6
Q317	A-5
Q318	B-6
Q321	B-5
Q327	A-6
Q328	A-6
Q401	B-1
Q403	B-1
Q406	C-2
Q417	B-4
Q420	C-7
Q421	C-7
VC401	B-2
VR101	E-2
VR102	D-6
VR103	E-3
VR104	D-4

VR105	D-3
VR108	D-5
VR109	C-3
VR111	E-7
VR112	E-6
VR301	A-5
VR302	B-7
VR303	A-7
VR304	A-5
VR403	B-2
VR404	A-2
VR601	D-1
VR602	D-2

RECORDER-MAIN P.C.

D101	C-6
D103	B-5
D104	A-5
D107	C-3
D110	C-3
D112	C-3
D402	C-7
D403	C-2
D405	C-7
D406	D-4
D602	A-1
IC101	B-2
IC103	C-4
IC104	B-4
IC105	B-2
IC107	C-5
IC301	D-6
IC401	E-4
IC402	E-3
IC403	C-2
IC404	D-3
IC405	E-2
IC408	C-2
IC410	E-5
IC411	D-3
IC601	A-2
Q101	A-2
Q103	B-6
Q105	B-6
Q108	A-5
Q115	A-5
Q117	A-5
Q122	B-3
Q125	B-5
Q126	B-5
Q128	B-5
Q132	C-6
Q133	C-2
Q134	A-6
Q135	A-6
Q137	A-6
Q139	A-3
Q140	E-5
Q141	E-5
Q145	C-6
Q146	C-6
Q147	A-6
Q151	C-2
Q157	C-7
Q158	B-6
Q301	D-5
Q302	E-5
Q303	E-6
Q306	E-6
Q307	D-6
Q310	D-5
Q314	D-6
Q320	D-5
Q322	E-6
Q323	E-6

Q324	D-6
Q325	E-6
Q326	E-6
Q402	D-1
Q404	D-4
Q407	D-5
Q408	D-5
Q409	D-3
Q410	D-3
Q411	D-4
Q412	D-4
Q413	E-4
Q414	D-5
Q415	E-5
Q416	E-5
Q418	D-1
Q419	D-1
Q601	B-1
Q602	B-2
Q603	B-1

< NOTICE >

RECORDER-MAIN P.C.B. consists of four layers.
(Soldering, Component, Power Supply and Ground patterns.)

※ Through-hole marks on each P. C. B. denote :

O : Soldering side ⟷ Component side

Ⓖ : Soldering side (Component side) ⟷ Ground

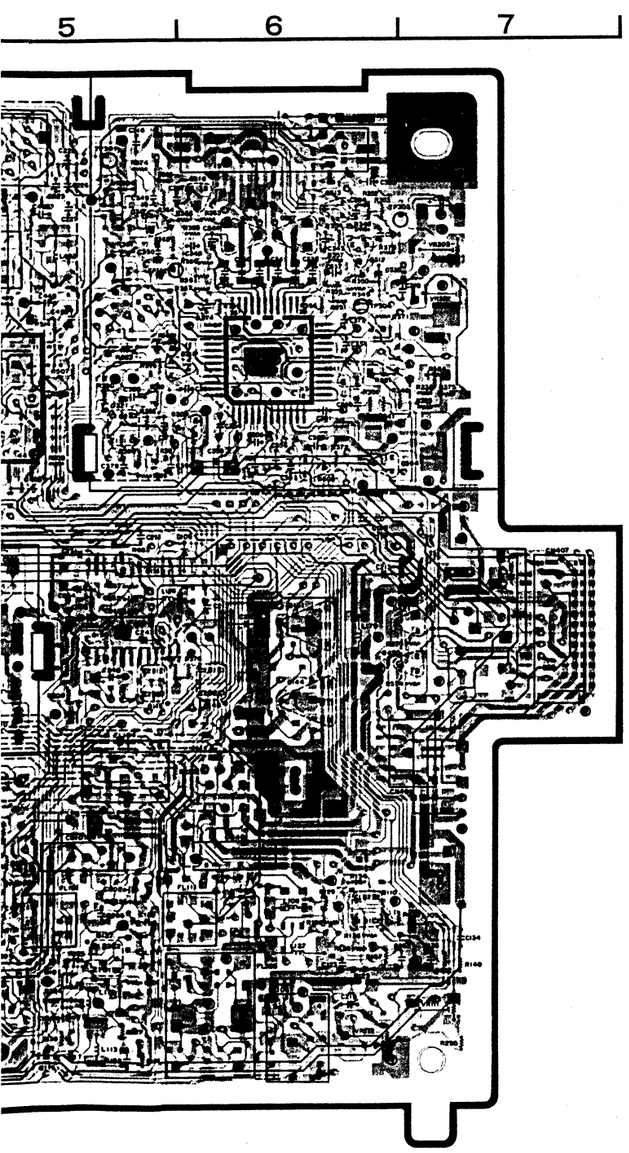
Ⓑ : Soldering side (Component side) ⟷ Power Supply

And, blue lines denote signal patterns which connected in the Ground or Power Supply layer.

Blue (————) : Power Supply layer

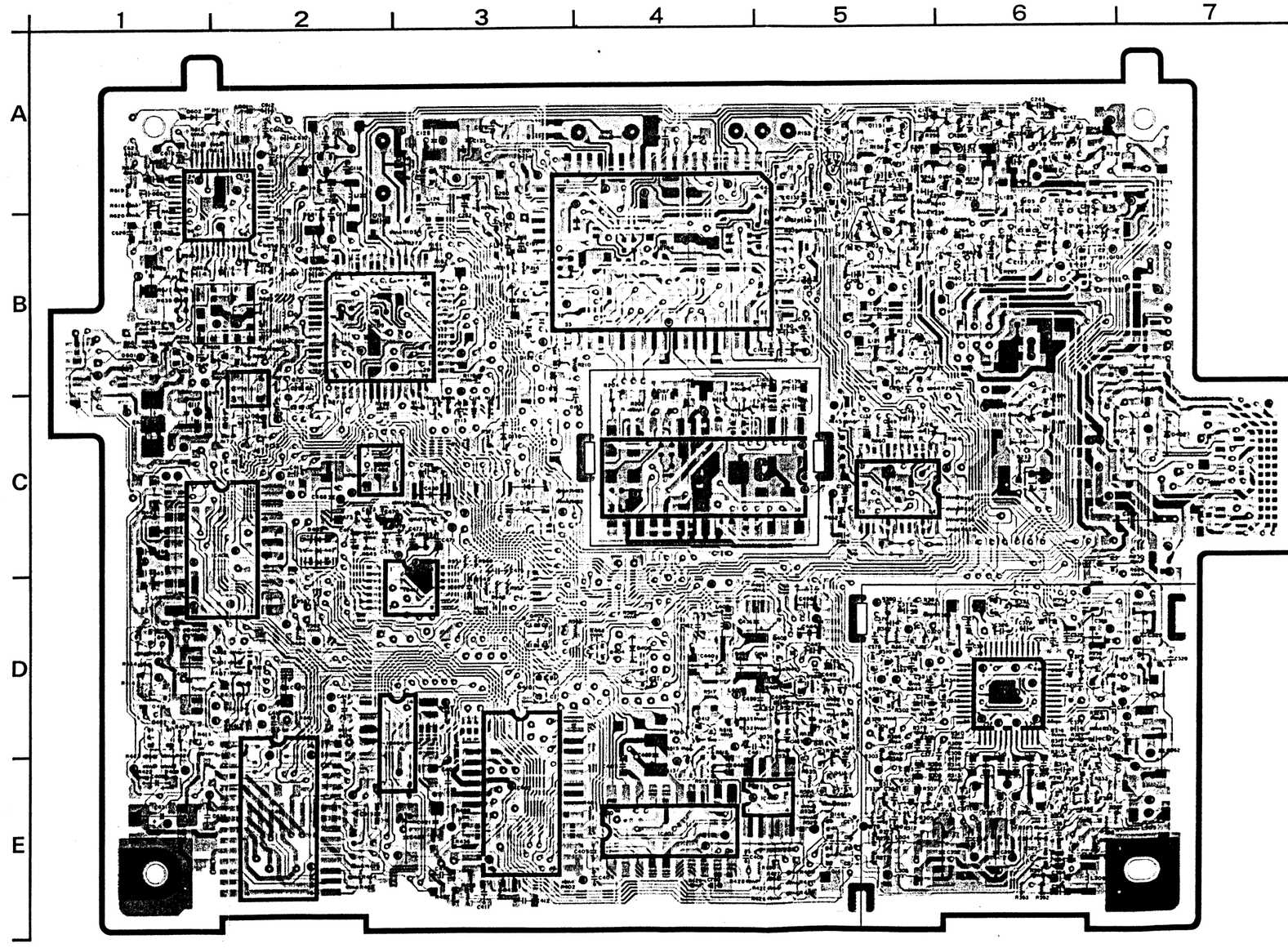
Blue (– – – –) : Ground layer

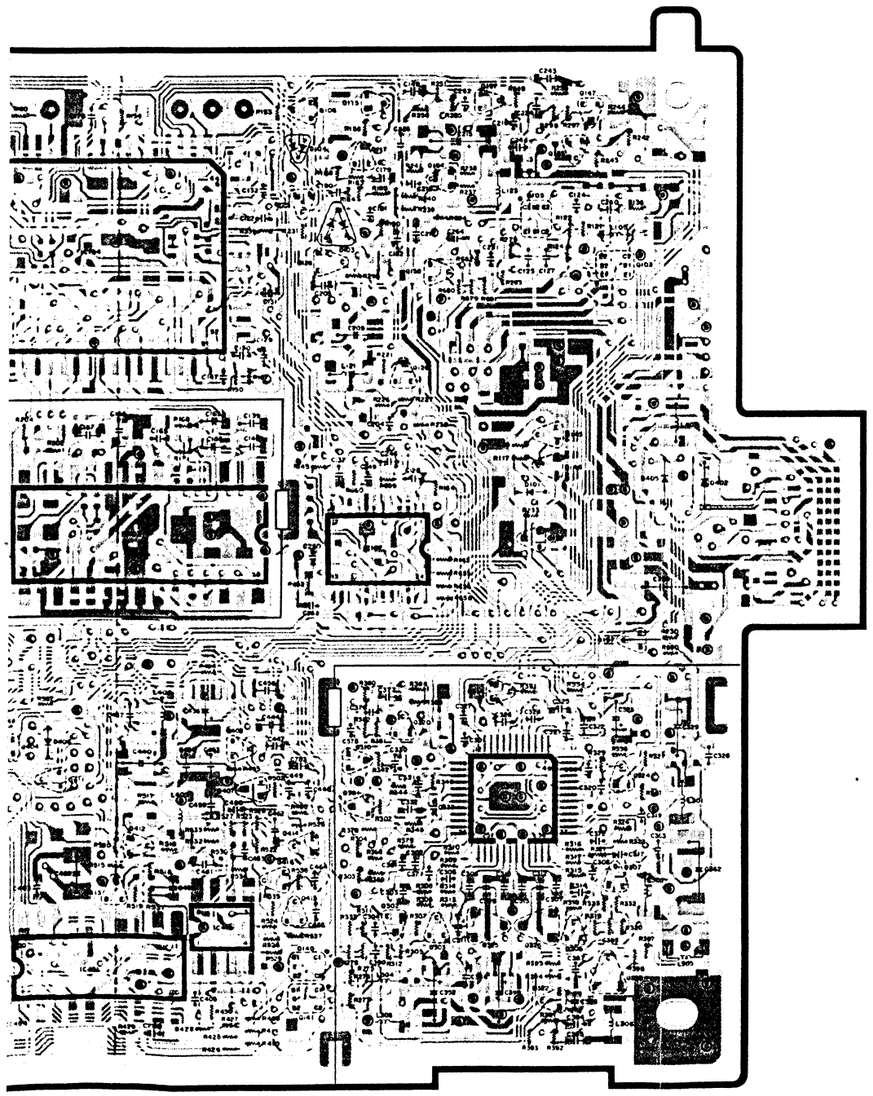
RECORDER-MAIN P.C.B. (SOLDERING SIDE)



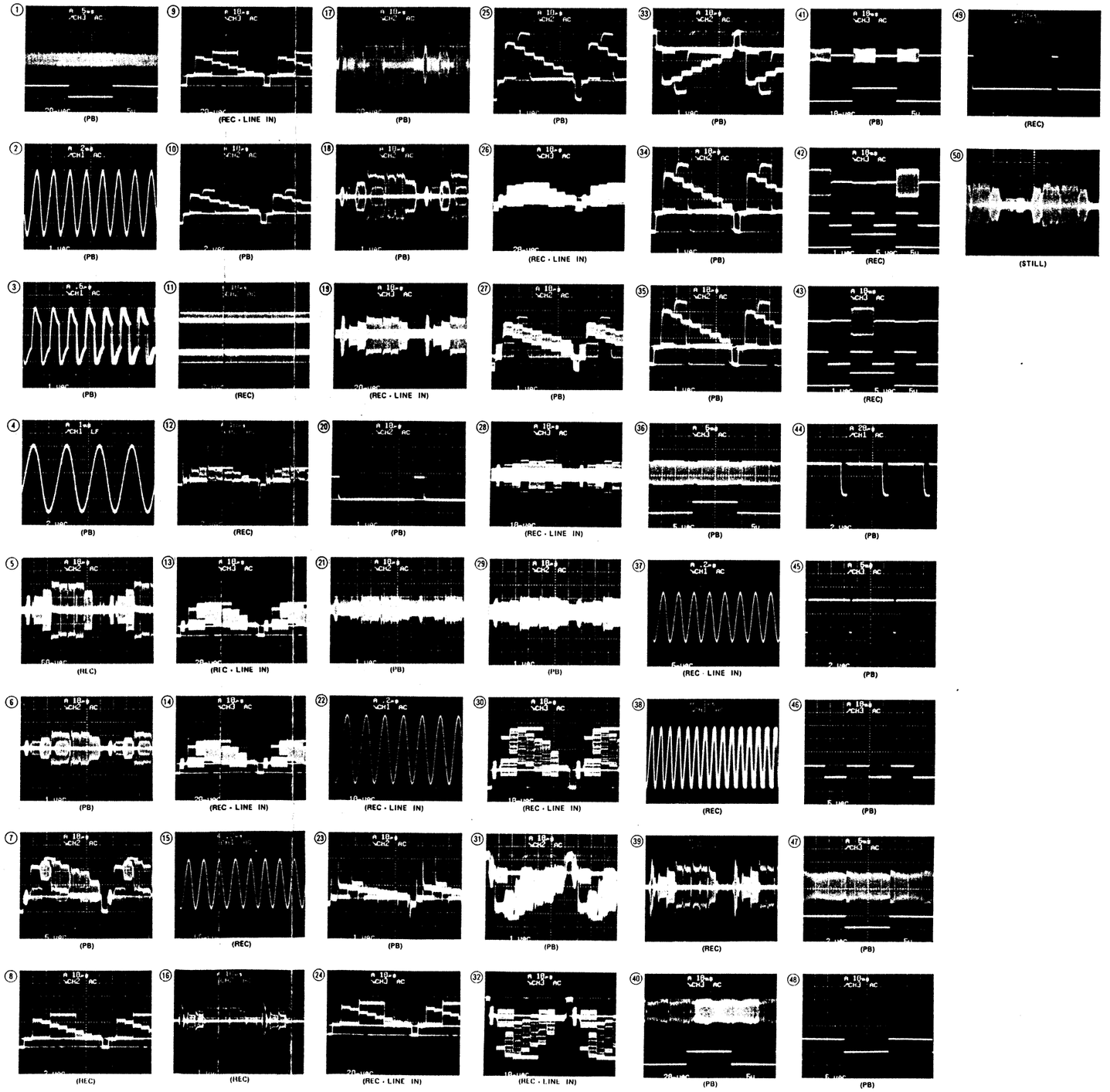
D101	C-6
D103	B-5
D104	A-5
D107	C-3
D110	C-3
D112	C-3
D402	C-7
D403	C-2
D405	C-7
D406	D-4
D602	A-1
IC101	B-2
IC103	C-4
IC104	B-4
IC105	B-2
IC107	C-5
IC301	D-6
IC401	E-4
IC402	E-3
IC403	C-2
IC404	D-3
IC405	E-2
IC408	C-2
IC410	E-5
IC411	D-3
IC601	A-2
Q101	A-2
Q103	B-6
Q105	B-6
Q108	A-5
Q115	A-5
Q117	A-5
Q122	B-3
Q125	B-5
Q126	B-5
Q128	B-5
Q132	C-6
Q133	C-2
Q134	A-6
Q135	A-6
Q137	A-6
Q139	A-3
Q140	E-5
Q141	E-5
Q145	C-6
Q146	C-6
Q147	A-6
Q151	C-2
Q157	C-7
Q158	B-6
Q301	D-5
Q302	E-5
Q303	E-6
Q306	E-6
Q307	D-6
Q310	D-5
Q314	D-6
Q320	D-5
Q322	E-6
Q323	E-6

Q324	D-6
Q325	E-6
Q326	E-6
Q402	D-1
Q404	D-4
Q407	D-5
Q408	D-5
Q409	D-3
Q410	D-3
Q411	D-4
Q412	D-4
Q413	E-4
Q414	D-5
Q415	E-5
Q416	E-5
Q418	D-1
Q419	D-1
Q601	B-1
Q602	B-2
Q603	B-1





SIGNAL WAVEFORMS



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SCHEMATIC DIAGRAM RECORDER-MAIN P.C.B. (VIDEO SECTION)

oSIGNAL PATH ——— REC Y+C SIGNAL (GRAY) ---- PB Y+C SIGNAL (GRAY) ——— REC Y SIGNAL (BLUE) ---- PB Y SIGNAL (BLUE)

RECORDER-MAIN P.C.B.(VIDEO SECTION)

IC601 IC602 IC102 IC105 IC107 IC101

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REC C SIGNAL (ORANGE)
PB C SIGNAL (ORANGE)
REC A SIGNAL (RED)
PB A SIGNAL (RED)
REC ATF SIGNAL (BLUE)
PB ATF SIGNAL (BLUE)

IC104
IC103
IC301 IC302

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CIRCUIT BOARD DIAGRA

JACK P.C.B.

D001	D-1
D002	F-1
D003	A-1
D004	F-3
D005	F-3
D006	F-3
D007	F-3
D008	A-2
IC001	D-1
Q001	C-2
Q002	C-1
Q003	D-2
Q004	E-1
Q005	D-2
Q006	E-1

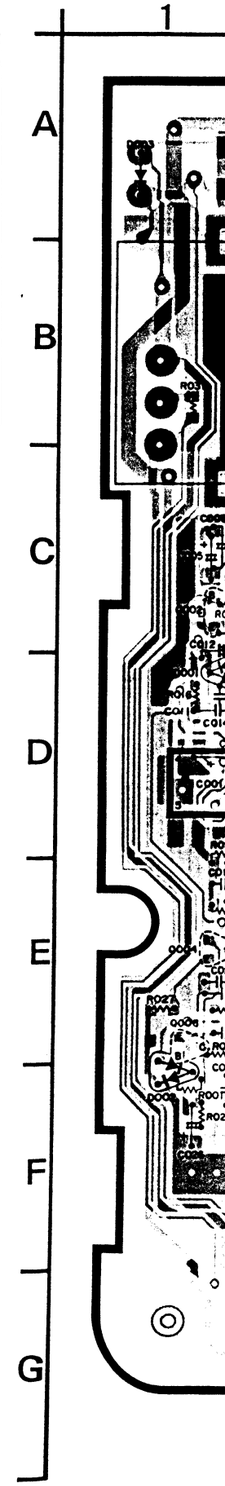
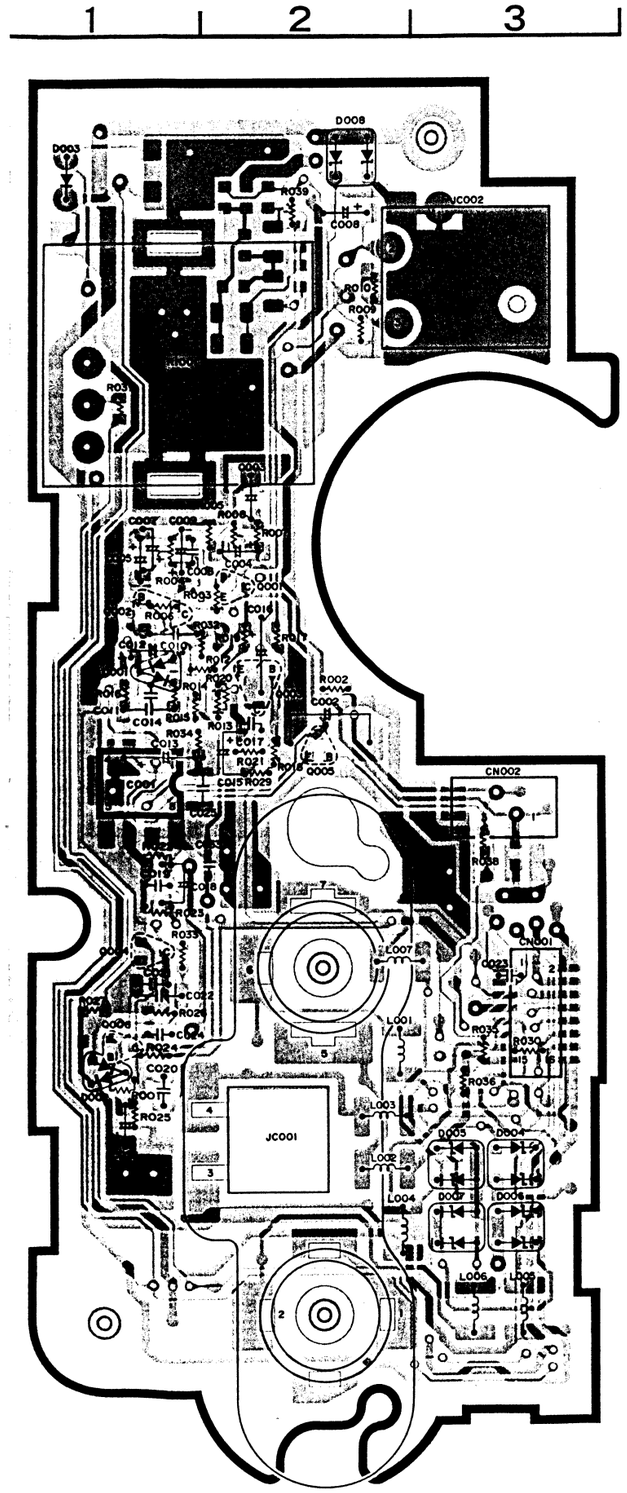
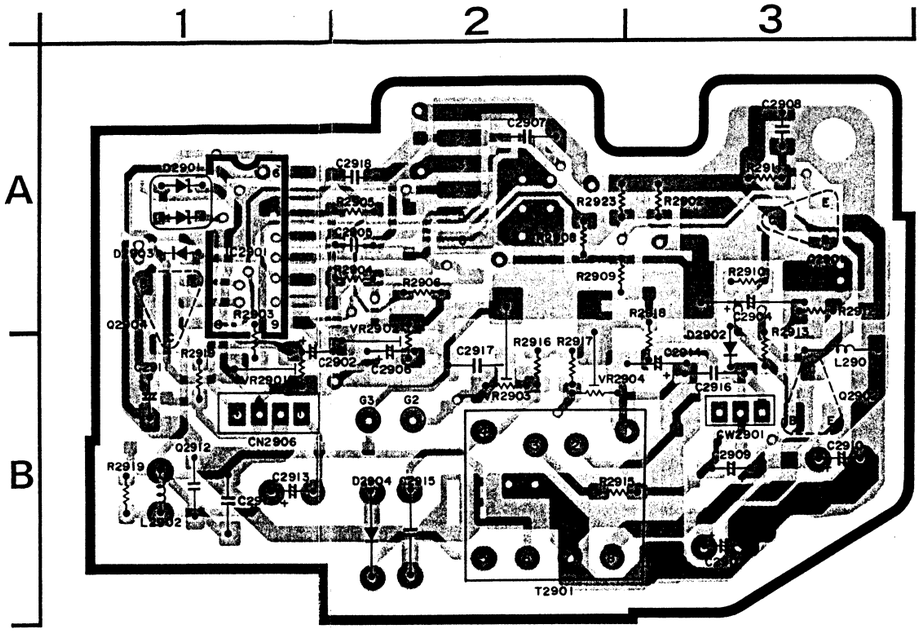


DIAGRAM JACK • EVF P.C.B.

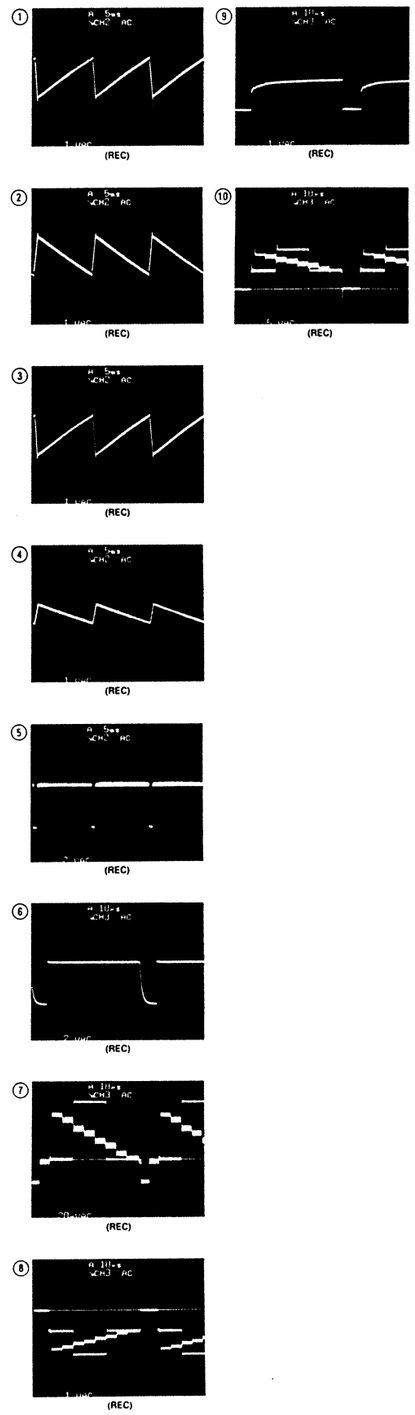


EVF P.C.B.

D2901	A-1
D2902	B-3
D2903	A-1
D2904	B-2
IC2901	A-1
Q2901	A-3
Q2902	B-3
Q2904	A-1
VR2901	B-1
VR2902	B-2
VR2903	B-2
VR2904	B-2



SIGNAL WAVEFORMS



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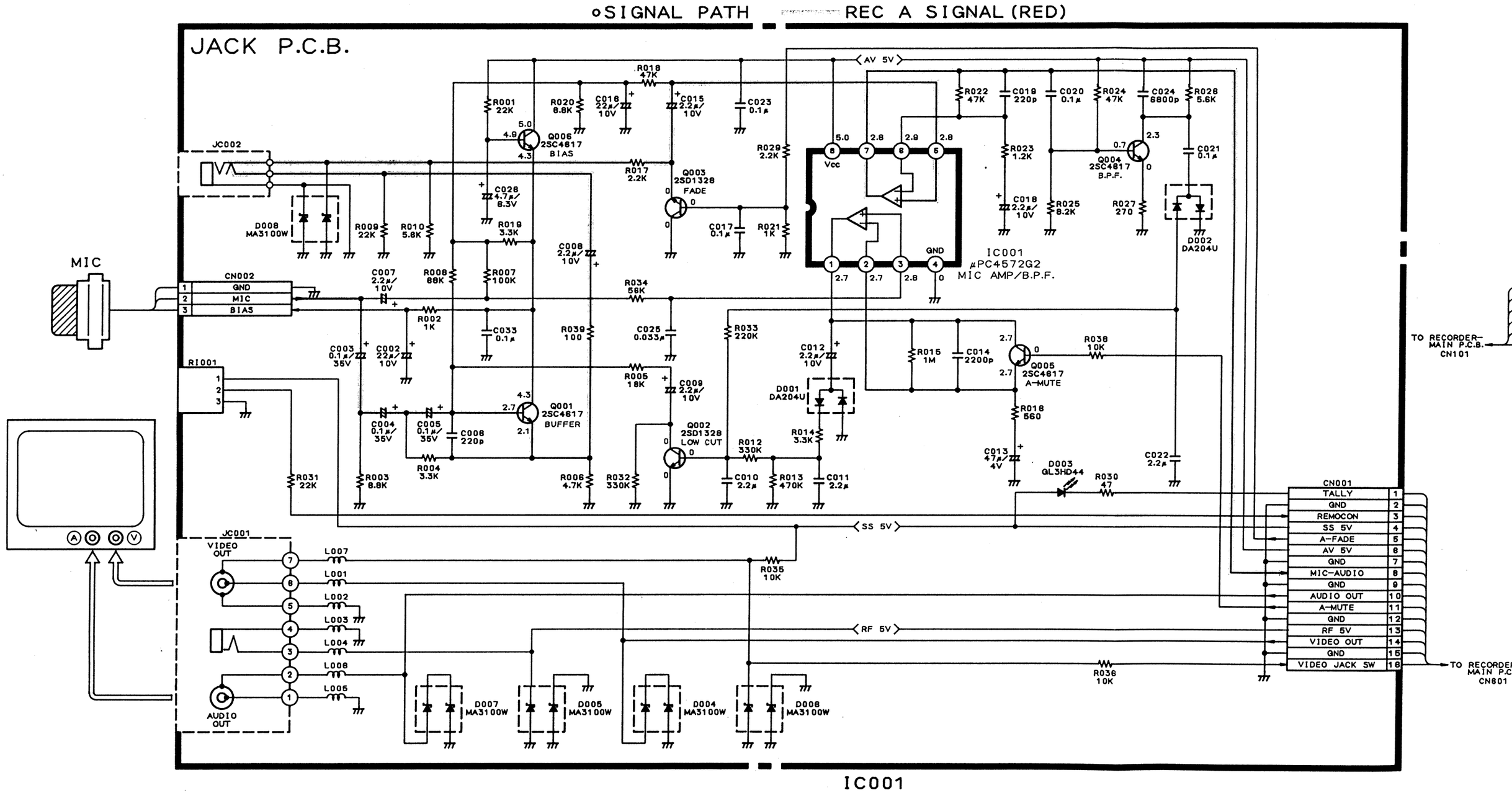
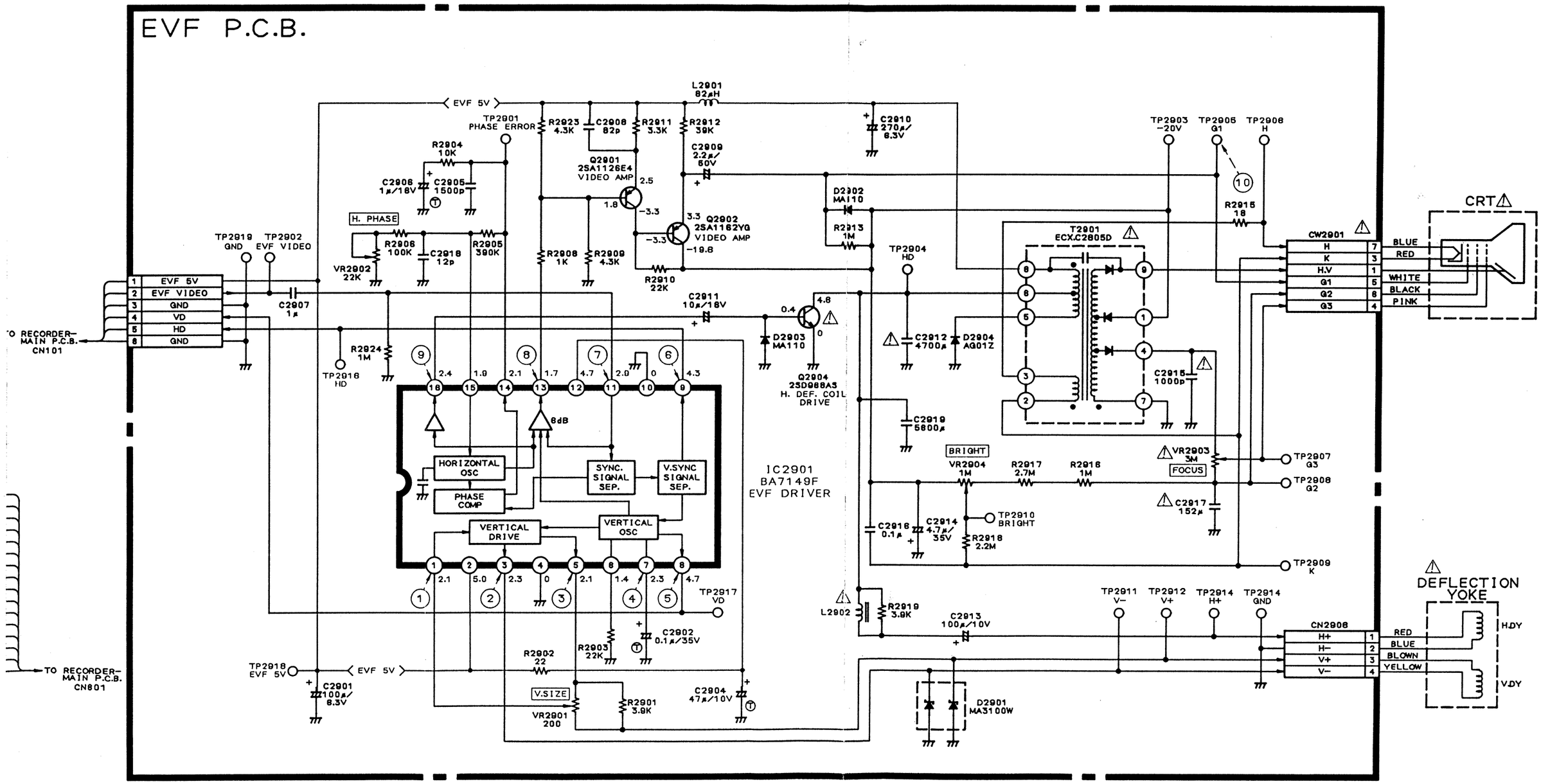
SCHEMATIC DIAGRAM JACK • EVF P.C.B.



IC001

01 Oct. 1991

EVF P.C.B.



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